THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, November 23, 1916 *No. 21*

Prices Are Advancing Rapidly

But Buying is Not Checked Except in Case of Furnace Coke—J. P. Morgan & Co. Place Orders for Very Large Tonnages of Shell Steel and Structural Material for Export

THE market is advancing rapidly toward higher price levels. The announcement by the Carnegie Steel Co. of an advance of $4 per ton on bars and shapes and $5 on plates which under ordinary conditions would be considered an event of importance, has aroused little interest for the reason that the prices are moderate in comparison with quotations of other companies for anything approaching prompt delivery.

J. P. Morgan & Co. have placed orders for 45,000 tons of beams and angles for first half of next year for export to France. One mill received about 20,000 tons. The price is understood to have been more than 3.25c, Pittsburgh.

Railroad Buying

Quickly following the announcement of the advance of $5 per ton by the Steel Corporation in the price of rails for 1918 delivery, many railroads have come into the market for that distant period and one independent mill reports inquiries of from 175,000 to 200,000 tons. The New York Central lines are in the market for 150,000 tons or more and all mills have received requests for reservations or have made definite sales.

Pig Iron

The pig iron market during the past week has been characterized by very heavy buying in New York territory and orders amounted to at least 100,000 tons, mostly for domestic needs. Active buying continues in the Philadelphia district, where transactions in basic have amounted to about 35,000 tons and low phosphorus iron has been a prominent feature. There is moderate activity in buying, with prices strong, throughout the south and central west. Purchases of malleable pig iron by leading Connecticut interests just closed are reported as 25,000 tons and may be more. These buyers had been seeking up to 50,000 tons for next year. Small lots of Eastern Pennsylvania No. 2X have sold at $28, furnace. Virginia No. 2X is quoted as high as $28, furnace.

Wage Advances

The advance of 10 per cent in wages of employes of the United States Steel Corporation, which has just been announced, makes an addition in wages of about 33 per cent during the present period of prosperity. All Youngstown steel companies have announced an advance of about 10 per cent and other independent companies are expected to make similar announcements.

Shell Steel

The entente allies, through J. P. Morgan & Co., have placed orders for fully 1,500,000 tons of blooms and bars for the manufacture of shell steel, for delivery during the last six months of 1917. It is understood that the Steel Corporation has booked from 500,000 to 750,000 tons, and that a large eastern producer has taken 200,000 tons, while another maker has orders aggregating 150,000 tons. A considerable part of the tonnage was closed at from 4c to 4.25c, mills, as against 3c to 3.50c on similar contracts for the first half of next year.

Coke

While in most cases price advances on many products are received as a matter of course, some blast furnace operators have refused to buy at the recent very high quotations on coke for prompt delivery and quotations receded somewhat last week, but sales at $6.75 have been made. Very high quotations continue to prevail on the foundry grades and $10 per ton is often paid for prompt delivery.

Scrap

The scrap market is excited and prices are being marked up rapidly. Heavy melting steel, which in July sold at $15.50, Pittsburgh, is now commanding $23, and still higher prices are expected. Large sales of heavy melting steel have been made in eastern territory, where the Italian government has purchased 15,000 to 20,000 tons of rails and ingot crops.

THE OPEN HEARTH

An Important Step

THE action taken at the meeting of the National Founders' Association in New York last week in organizing the National Industrial Conference Board is a highly important step in the right direction. For several years, some of the organizations now affiliated in this conference board have been acting more closely in many matters of common interest and, owing to the friendly feeling which has been cultivated, it will be easier to bring about the still closer relations provided for under the new plan.

While in the past problems both numerous and serious have confronted employers and employes, the great war is causing conditions which promise to result in problems much more intricate and difficult of solution than those of the past. There is no doubt that labor is now scarcer and more inefficient than ever before. Wages of many employes have been advanced rapidly, while those of salaried employes have made little advance. Many laborers receiving wages higher than they had ever dreamed of are showing utter failure to appreciate the opportunities for saving money and providing for the inevitable rainy day. These and other facts which might be cited indicate how serious will be the situation when the day of readjustment of wages comes, as come it surely must.

By avoiding duplication of work, and by giving each other the benefit of experience, and by acting in harmony with employes' representatives who have proved themselves to be reasonable, the National Industrial Conference Board can bring about highly beneficial and lasting results.

Prices and Conditions

AS PRICE advances are announced frequently in these days of wonderful prosperity, the question naturally arises, To what extent is the upward movement justified by actual conditions?

The advance of $5 per ton in steel rails must be regarded as very moderate in comparison with the general trend of prices. Quotations on bessemer steel rails had remained at $28 from May, 1901, until April, 1916, when an advance of $5 per ton was announced, making the price of open hearth rails $35 and that of standard bessemer $33. Open hearth had been quoted for several years at $30. It was, of course, manifest that the price of rails had not been at all responsive to the ups and downs of the trade, but had been maintained because both the mills and the railroads were satisfied and believed that regularity of prices was greatly to be desired. The $5 advance was received without unfavorable comment by most of the railroad men, as has the latest advance of $5, making the new quotation $40 on open hearth and $38 on bessemer. It was at first supposed that the advance would apply to 1918 delivery only, but as the mills have taken orders almost up to their capacity for 1917, the announcement that the new price is in effect as to next year as well as 1918 will not affect a large tonnage. In comparison with other finished materials, the price of steel rails is still low. With steels bars quoted at a minimum of $58, Pittsburgh, beams $60, and plates $70, and very much higher prices being asked for anything like prompt delivery, the new quotations on rails are indeed low. Their justification lies in increased costs of material and labor.

Turning to the recent fixing of the carrying charge for iron ore at $1, net, or $1.10, gross, from the head of the lakes, a somewhat different situation is found. Ore carrying rates have shown rather wide fluctuation and only once has a higher rate been charged since 1894, that of $1.25, gross, from the head of the lakes in 1900. The high rate of 1900 followed the boom prices of 1899, when quotations on all products soared, but in 1900, prices descended rapidly and the wild rate on ore averaged only 84½ cents. In the past 16 years, vesselmen have experienced some disastrous years, some years of fair profits and a few years of large earnings. During the present year, although considerable wild tonnage has been placed at $1, the contract rate which governed on a large percentage of the business of the season was only 50 cents, net, and the profits of the year for many boats have not been large. With the increase in costs, owing to the higher wages and higher prices of all kinds of supplies, the vessel men naturally have felt justified in making the sharp advance which has taken place and shippers will not be in a position to challenge it. In fact, it is probable that considerable wild tonnage will be placed at more than $1 during the coming season. The ore shippers who have insisted that the carrying charge should be determined before the starting of the buying movement for ore have gained their point and now have a more definite basis on which to figure ore prices.

A Striking Contrast

THE anarchistic attitude so frequently taken by union labor and the reasonable position generally characteristic of employers were strikingly illustrated a few days ago in connection with the legal battle which has been inaugurated to determine of the constitutionality of the so-called Adamson eight-hour law. When a judge of a New York district court signed an order directing the defendants,

THE OPEN HEARTH

the United States attorneys, to show cause why they ought not be enjoined from enforcing the law, Samuel Gompers, president of the American Federation of Labor, was quoted as saying:

"The eight-hour law will go into effect, injunction or no injunction."

On the same day that Mr. Gompers made the above defiant statement, Elisha Lee, chairman of the committee which represented the railroads in the conference with the brotherhoods, issue a statement in which he calmly and fairly explained the position of the railroads. He pointed out that eminent authorities held that the law is unconstitutional and the railroads felt it their duty to determine the question. He said that the railroads have no desire to delay action or resort to technicalities, but are anxious to have a speedy decision and would, of course, follow the instructions of the court.

In such statements as the above, one favoring defiance of the courts and the other prompt obedience to court mandates, there can be no doubt as to who will ultimately have the sympathy of the vast majority of the people of the country.

Resting One Day

THE statute of the state of New York known as the one-day-rest-in-seven law, requiring all manufacturers in the state to cease operating on Sunday, except where the nature of the work makes this absolutely impossible, is founded, like all other Sunday laws, on the principle that the state has the right to require all men to rest one day in seven, not for any religious reason, but because their physical, mental and moral welfare demands it. In a recent hearing which the New York industrial commission held on the petition of the Lackawanna Steel Co. for permission to run its entire steel works Sundays, it was developed that the steel company merely asked for the same liberty that is enjoyed by competitors in other states. The company is entirely willing to allow each employe at least one day's rest in seven, but it is anxious to allow the workmen their own choice as to the day of rest and to so arrange the work, if possible, that the entire plant can be operated every day in the week. The commission made a trip of inspection through the plant, was shown the necessity of keeping the blast furnaces and coke ovens in operation, and it was clear that the open hearth furnaces could not operate with the same efficiency if allowed to remain idle one day each week.

Naturally, there was strong opposition to the company's plan from labor unions, social workers and religious organizations, but we are of the opinion that the company is within its legal rights in asking permission to operate its plant, if it requires every man to rest one day of the seven. We believe that the commission should insist on every man taking at least one day of rest, but it ought to be possible to allow the men to rest on other days than Sunday, if they wish to do so.

Holding the Man Responsible

A NOVEL method of holding the individual employe responsible for his acts is being made by foundrymen of Bridgeport, Conn., as described in an address delivered before the National Founders' Association in New York last week by Edward K. Nicholson, counsel for the Bridgeport Manufacturers' Association.

Early in August of this year, a strike was started among the foundries of Bridgeport with the usual features, such as picketing of the peaceful and other kind and other forms of attempts to injure the business of the employers. It was recognized that the evasion of injunctions is often easy and it was decided to bring suit against individual defendants, asking for damages for injury to property. Suits were accordingly brought by a number of foundry companies against the local molders' union, officers of the union and a large number of individual strikers. The real estate and bank deposits of the defendants were attached and, if judgment can be secured, property of the defendants will be used to meet the judgment. Mr. Nicholson stated that the institution of the proceedings aroused a great deal of discussion and the general impression prevailed that the action which was taken was peculiar to the state of Connecticut by reason of its laws in regard to attachment, and he added that so far as the attachment is concerned, prior to trial, this is true, but he also declared that there is no reason why actions identical in their nature could not be brought in almost every state.

Mr. Nicholson did not refer to the Danbury hatters' case, but the suits which he described seem to be aimed at the individual for his own acts, while in the famous Danbury case, individuals who had not directly participated in the strike were held responsible for the acts of the union. As a decision has not been obtained in the Bridgeport suits, it is impossible to predict what will be the result of the litigation, but the proceedings will be watched with interest. Ordinarily, the individual who walks the straight and narrow path of rectitude is perfectly willing to be held responsible for his acts and does not wish to transfer his responsibility to any organization. Certainly the labor union men ought not to be willing to shirk responsibility.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products November 22, average for October, 1916, average for August, 1916, and average for November, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Nov. 22, 1916.	Aver. for Oct., 1916.	Average for Aug., 1916.	Aver. for Nov., 1915.
Bessemer pig iron, Pittsburgh..	$30.95	$24.325	$21.95	$17.45
Basic pig iron, Pittsburgh.....	25.95	20.825	18.95	16.70
No. 2 Fdy. pig iron, Pittsburgh	26.95	21.075	19.45	16.45
Northern No. 2, Fdy., Chgo...	27.50	19.15	19.00	17.12
Lake Superior Charcoal, Chgo..	26.75	20.35	19.75	17.50
Malleable, Chgo.	27.50	19.50	19.50	17.40
Southern No. 2, Birmingham...	20.00	15.13	13.75	13.13
Southern Ohio No. 2, Ironton..	25.50	19.38	18.50	16.13
Basic, eastern Pa.....	26.50	20.75	19.25	17.75
No. 2X Virginia furnace.....	25.00	18.50	18.50	15.50
No. 2X foundry, Philadelphia..	26.00	20.75	19.75	17.50
Ferro mang., Balti.....	164.00	162.00	175.00	100.00
Bessemer billets, Pbgh.....	55.00	45.75	43.60	27.75
Bess. sheet bars, Pbgh.....	55.00	45.75	43.60	28.25
Op.-h'th sh. bars, Pbgh.....	55.00	45.75	43.60	28.50
Open-hearth billets, Pbgh.....	55.00	45.75	43.60	28.00
Steel bars, Chgo.....	3.30	2.79	2.77	1.79
Steel bars, Pittsburgh, contr...	2.90	2.60	2.50	1.625
Iron bars, Philadelphia.....	2.659	2.659	2.559	1.759
Iron bars, Cleveland, local del'y	2.90	2.55	2.40	1.50

	Prices Nov. 22, 1916.	Aver. for Oct., 1916.	Average for Aug., 1916.	Aver. for Nov., 1915.
Iron bars, Chgo. mill.....	$2.60	$2.35	$2.35	$1.48
Beams, Chgo.	3.30	2.80	2.77	1.79
Beams, Pittsburgh, contr.....	3.00	2.70	2.50	1.625
Beams, Philadelphia	3.159	2.859	2.709	1.809
Tank plates, Pbgh., contract....	3.50	3.00	2.90	1.625
Tank plates, Chicago.....	3.75	3.19	3.17	1.79
Tank plates, Philadelphia.....	3.909	3.309	3.909	1.809
Sheets, blk., No. 28, Pbgh.....	4.00	3.225	2.75	2.22
Sheets, blue an., No. 10, Pbgh.	3.75	3.125	3.00	1.85
Sheets, galv., No. 28, Pbgh....	5.50	4.45	4.25	3.90
Wire nails, Pittsburgh.....	2.85	2.625	2.59	1.87
Connellsville fur. coke, contr...	3.75	3.375	2.40	2.35
Connellsville fdy. coke, contr...	6.00	4.875	3.15	2.96
Heavy melting steel, Pbgh.....	23.00	17.87	16.00	15.31
Heavy melting steel, east'n Pa..	21.00	15.50	15.00	14.50
Heavy melting steel, Chgo.....	20.00	16.50	14.90	13.15
No. 2 wrought eastern Pa.....	24.50	22.00	20.00	17.00
No. 1 wrought, Chgo.....	22.00	17.50	15.40	12.75
Rerolling rails, Chgo.....	26.00	18.75	15.70	14.30
Car wheels, Chgo.....	17.25	12.25	11.90	12.75

(For Additional Prices See Page 1074.)

Heavy Buying of Pig in the East

Fully 100,000 Tons Purchased in the Metropolitan District —Fair Buying in Other Sections, With Increasing Firmness of Prices

New York, Nov. 21.—Another wave of tremendous pig iron buying has fallen within the week in the metropolitan district and the total volume of sales closed has been at least 100,000 tons, the large part of which is for domestic consumption. Some of the iron booked has been by executive action here, but for shipment outside this territory. This applies among others to one transaction of about 20,000 tons of basic for last half, which went to Alabama makers. Other sales of basic by eastern Pennsylvania and other producers aggregated 15,000 to 20,000 tons, on which $26, eastern Pennsylvania, and $20, Birmingham, were the prices. All the $20 southern basic now is said to have been absorbed and $23, for last half, has been quoted. Round lots of malleable, bessemer, foundry, charcoal and other grades were included in the week's turnover. Most of this business was closed privately and many details are not available. Connecticut consumers, however, were buyers of from 15,000 to 20,000 tons in the week. A Plainfield, N. J., buyer closed for 2,000 tons of foundry, and the New York Central railroad for 1,000 to 1,500 tons.

Some round lots still are under negotiation, one for 5,000 tons. Higher prices rule all around. Eastern Pennsylvania No. 2X is selling freely at $26, furnace, or $26.74, tidewater. No. 2X, Central Pennsylvania brands, have been sold at over $28, tidewater. Alabama No. 2 up the state has gone at slightly under $27, delivered, or $21, furnace. Export trade is keeping up its activity. J. P. Morgan & Co., who inquired for 30,000 to 40,000 tons of bessemer and special bessemer, have made liberal purchases. There was one purchase of 10,000 tons from an eastern maker. High silicon bessemer has been purchased at $31, furnace, and higher now is wanted. Special bessemer has commanded $35, furnace. The foreign inquiry is heavy. Sweden has asked for a new block of 20,000 tons of foundry for first half. On 6,000 tons of low phosphorus for Japan for last half, $45, eastern furnace, was quoted. The New Haven railroad has modified its embargo on pig iron into New England and where consumers are in pressing need, metal is admitted to them. The ban on coke has been lifted.

Large Basic Inquiry

Buffalo, Nov. 21.—There has been a falling off in sales of pig iron in the past week and to an extent that may be termed an intimation of a holding off on the part of melters with the purpose in mind of seeing whether a possible softening of the not only firm but rising prices of pig iron may be accomplished. Under market conditions that formerly existed, such a concerted movement of buyers has met with results, but a careful survey of the situation presented now shows that such a policy will only gather fury for the market developments that apparently must come in the face of the facts that there is absolutely not enough of any kind of iron for anybody.

Shortages of iron under contract to meet not only normal but increasing requirements for all parts of next year and the approaching absolutely sold-up condition of producing interests, present a situation that will grow more keenly serious as consumers hold off placing with the furnaces such tonnages as they are able to get the ironmakers to book.

Freight differentials are being disregarded in pending negotiations and grade differentials have been largely wiped out in the quotations being made by some interests.

There is an inquiry before the market for 25,000 tons of basic for last half delivery of 1917. Another furnace interest here reports that it is out of the market for the time being. It was previously reported that a

(*For complete prices see page* 1074.)

large local producer was sold up solid and out of the market until Jan. 1, 1918. A third interest producing steelmaking iron has just announced that its minimum for last half of next year on foundry and other grades is $30 at the furnace. Bessemer is now being quoted at $30 to $31, f. o. b. Buffalo.

Activity Continues

Philadelphia, Nov. 20.—Activity of pig iron consumers in covering for their future requirements is being maintained and the buying in this territory is swinging more and more to the last half of 1917. The major portion of the business closed the past week has been for that period and the buyers have been willing to pay freely the advanced prices on these orders. There is little or no demand for spot iron. The last half buying has been stimulated by the fact that several of the eastern Pennsylvania makers who up to this time had been avoiding quotations after July now have opened their books to Jan. 1, 1918.

Basic has contributed 30,000 to 35,000 tons to the week's sales. A Harrisburg steelmaker closed for 10,000 tons and another buyer outside the eastern Pennsylvania district for 6,000 tons with the same eastern Pennsylvania maker. In both cases, the delivery was for last half and the price $26, furnace, or from $27 to $27.25, delivered to the buyer. This is an advance of about 75 cents in the furnace price over the last previous sale. A Coatesville, Pa., consumer placed 15,000 to 20,000 tons additional for second quarter, but in this competition Alabama makers undersold the nearby furnaces and took practically all the business at $25.25, delivered, or $20, Birmingham. The quotations on eastern Pennsylvania basic generally were $26, furnace, or 26.50 to $27, delivered. Some other basic negotiations are continuing.

The rise in low phosphorus iron keeps up. The week's sales of standard iron by one maker were from 12,000 to 15,000 tons for both first and second half. One sale of 5,000 tons was for first half. The prices were on an ascending scale or from $45 to $47, Philadelphia, equivalent to about $42.50 to $44.50, furnace. The last and highest sale was at about $47, delivered, to a buyer in this district. Leading makers now quote $47 to $49, Philadelphia, according to specification, and prices are good only for reply the next day. From 10,000 to 15,000 tons of domestic and a large amount of export inquiry in low phosphorus is pending.

Certain eastern Pennsylvania makers of foundry iron have been quoting $26, furnace, for No. 2X, or $26.74, Philadelphia, for last half of 1917, and have made liberal sales. No. 2 plain also has been sold at the same price. Another maker, having sold a fair amount of iron for shipment by July at $26, furnace, for No. 2X, has advanced to $27, furnace, and has booked some small lots for first quarter on this basis. Other eastern makers are naming from $25 to $26, furnace. There is very little, if any, $24 Virginia iron now available, and at least two makers are out of the market. One producer asks $26 for high silicon. Alabama makers have quoted here $22 for first half and $20 to $21 for last half. A sale of 1,000 tons of prompt eastern Pennsylvania standard forge was made at $24, delivered, and on 7,500 tons for last half, $24.50, furnace, was named. An inquiry for 5,000 tons of No. 2 plain is out. A lot of 1,500 tons of last half malleable brought about $28.50, delivered this district.

Buying for Second Half

Chicago, Nov. 21.—The entire pig iron market, as represented in Chicago, has resolved itself practically into a case of the selling agent submitting every proposed sale to the furnace before closing. This has become necessary because no quotation now made is guaranteed to be good much beyond the end of the conversation in which it is made.

Northern No. 2 foundry and malleable are still quoted at $27 to $28, furnace, with most sales being made at the minimum. There is practically no demand for prompt iron, and comparatively little for first half delivery, most of the business being booked at present being for second half of 1917.

Inquiry for last half iron has become more general and is increasing steadily. Sales have been made of lots as high as 1,000 and 2,000 tons and some inquiries are now coming out for even larger quantities.

Southern iron has firmed up considerably, and the former quotation of $20, Birmingham, has disappeared. Some business can be placed at $21, Birmingham, for first or second half, although it is increasingly difficult to contract for first half iron, as most southern furnaces have booked all they can handle for this delivery. A number of makers in the south are asking $22 to $23, Birmingham, and believe they will be able to place their tonnage later at that price.

Lake Superior charcoal iron is irregular, and $25 to $27, at furnace, probably represents the market fairly. This is subject to a freight rate of $1.75 to Chicago. Most of the charcoal business now being placed is for second half, as first half tonnage has practically all been sold.

An improvement in inquiry for domestic ferro-manganese is noticed, with prices growing firmer, and most sales made at the maximum, about $165 per ton, at the furnace.

Jackson County silveries are much stronger, and quotations now are $32 to $35, at the furnace, with some makers asking as high as $40, furnace, with a freight rate of $2.54 to Chicago. It is increasingly difficult to place business at any price for this grade of pig iron.

Inquiry is current by a new open-hearth plant in central Illinois for basic iron for next year. This calls for 2,500 tons for first quarter, 5,000 tons for second quarter, and 10,000 tons for third quarter. It is believed that part of this business has been placed with southern makers, but that the greater part of the tonnage is still pending.

Very Little Inquiry

St. Louis, Nov. 20.—Inquiries for pig iron are scarce in this market, and virtually confined to car lots and prompt shipment, and sales last week were few, the best one perhaps being 500 tons of bessemer silicon iron. Prices are firm, however, and inclined to further advance. Southern No. 2 is held at $20 to $21, Birmingham, for prompt delivery and shipment over the first half of next year. Northern iron is quoted at $25 to $26, Chicago, and $25 to $26, Ironton.

Market Quiet, But Prices High

Pittsburgh, Nov. 21.—The general pig iron market, although quiet, continues to offer some news of interest. A Birmingham, Ala., company is negotiating for a small tonnage of bessemer iron in this district. Whether the iron is for the manufacture of ingot molds, for export, or for the prospective buyer's own use is not known. Approximately 5,000 tons of bessemer iron in the aggregate have been sold at $30, valley, and reports of sales at $31 are heard. Some dealers are asking $31.50 for delivery next year. The market for basic pig iron is quiet, but reflects a strong undertone. Most dealers are asking $27, valley, for this grade. A blast furnace company, which does not want to change one of its stacks from bessemer to basic iron, last week purchased 7,000 tons of the latter grade from a valley producer and likely will buy from 10,000 to 15,000 tons additional at an early date. The iron is being shipped to a consumer having plants in western Pennsylvania

(*For complete prices see page* 1074.)

and eastern Ohio. Foundry and malleable grades are well pegged at $26, with scattering sales reported at $27, valley.

It appears more likely that an acute scarcity of bessemer iron will feature the market next year. It is pointed out by iron ore shippers that not enough bessemer iron will be available in 1917 to meet demands of consumers. No. 4 furnace of the Shenango Furnace Co. will make bessemer iron after Jan. 1.

Serious Car Shortage

Cleveland, Nov. 21.—Owing to car shortage, delivery of pig iron to Cleveland foundries is very slow and many of them are working from hand to mouth in constant danger of being compelled to shut down. Furnaces have large piles of pig iron sold which they are unable to deliver on account of not getting cars. Inquiry continues very active and includes one for a large tonnage of basic from a northern Ohio company which is building a steel plant. This company some time ago purchased a block of about 30,000 tons which, it is understood, it has since sold at a comfortable profit. At the time of the transaction, the iron was regarded as speculative. Inquiries for various grades, particularly malleable, are coming from eastern Pennsylvania and as far east as Maine, but Cleveland sellers are quoting so high that they are not likely to take much business. For example, on 2,000 tons of malleable for delivery in eastern Pennsylvania, the last half of next year, $28, furnace, was quoted. One furnace company, which sold a considerable tonnage at $25, Cleveland furnace, for No. 2 foundry, has since taken very little business and will not now sell at less than $27.

Prices Unsettled

Birmingham, Ala., Nov. 20.—The base price of Birmingham district iron is very unsettled at this time. While it looked as though the strong upward trend of the market would culminate around $25 per ton by the end of the year, there has been some halt in prices by the free selling of one interest at $19 per ton for last half delivery. Some of the producing interests are quoting, and making sales, on the basis of $21 to $22 per ton for prompt or first half delivery, yet this $19 price has more or less demoralized the last half price. Some special analysis iron has been sold around $25 per ton for last half shipment. It is characteristic of the southern market to run along smoothly for a spell, and then be upset and rendered unstable by some company pursuing the "gum shoe" policy. Southern basic iron is strong, and unless some more furnaces should be turned over on this product, there will be little to offer. The Gulf States Steel Co. has leased the old Eagle furnace at Attalla for making basic iron for its Alabama City steel works.

Getting Stronger

Cincinnati, Nov. 21.—The southern pig iron market, while still uncertain, is gradually gaining in strength. Yesterday one southern interest would sell for the whole of 1917 at $20, Birmingham basis, for No. 2 foundry, but today has withdrawn that price and will accept business for the last half only at $20. The price for the first half of 1917 is from $21 to $22, Birmingham basis. Practically every stack in the south is asking a premium for first half shipment. Prompt shipment iron is very scarce and is being held as high as $25 and $26, Birmingham basis.

The price of southern Ohio No. 2 foundry iron has advanced $1 a ton and is now quoted from $25 to $26, Ironton basis, for the last half of 1917. No quotations are out for the first half of next year on southern Ohio basic, foundry or malleable iron. A limited amount of silvery iron can be had for 1916 shipment around $30, furnace, for 8 per cent silicon. Makers of this grade are declining to sell for 1917 delivery.

Inquiry and sales were better yesterday, but have fallen away today. The situation, however, is showing such strength that advances of $1 a ton on both southern and southern Ohio iron are expected before the end of the present week. It is almost certain that southern iron cannot be had at $20 or southern Ohio at $25 after today or tomorrow.

The Vulcan Steel Co., New York, has an inquiry in this market for 6,500 tons of foundry iron and from 5,000 to 10,000 tons of low phosphorus iron. The Worthington Pump Corporation is still out for 25,000 tons of foundry iron for delivery to its various plants over the last half of 1917, with the exception of a small lot for delivery next month. The Indiana reformatory has purchased 700 tons of foundry iron and is out for a similar tonnage for the first quarter. A Lansing, Mich., manufacturer is inquiring for 1,000 tons of foundry iron for first quarter shipment, and an Illinois wire maker is out for 17,500 tons of basic iron.

Moorehead Bros. & Co., Pittsburgh, plan to put their 16-inch mill at Sharpsburg, Pa., in operation, Dec. 1.

(*For complete prices see page* 1074.)

Ferro Prices

Show a Decided Tendency to Stiffen—Spiegel Supply Short

New York, Nov. 21.—Domestic ferro-manganese shows a distinct stiffening in price as the result of a considerable volume of recent sales. Early in the week, there were small sales of domestic product for prompt shipment at $160, furnace, but subsequently the makers would not entertain less than $165, furnace, delivered, and this price seems to be held more uniformly. One of the large eastern steel works producers in the east which has been selling some tonnage recently has withdrawn from the market and is making no offerings at present. It is difficult to gage how much tonnage lately has been booked by the domestic producers for delivery running through the first half of next year and beyond, since most of this business has been put through quietly. The consumers, apparently realizing that the English price of $164, seaboard, is out of the running for the time being, have not been putting out their inquiries freely, but have conducted their negotiations privately with the home makers. It is learned that one eastern merchant maker disposed of about 5,000 tons recently, approximately half of which was for export. Other mixed sales of about 1,000 tons were made within a few days. Current inquiries are about 1,500 tons. There is some talk that English makers, because of their inability to compete at their present price of $164, seaboard, with the domestic product, may decide to reduce their schedule in the near future.

The supply of spiegeleisen has become short and prices have firmed up decidedly. Some makers have put up their quotations as much as $10 within the week. A few days ago, one large maker was willing to accept $45, furnace on 14 to 18 per cent, but now is asking $55, minimum, for metal of this quality.

Indian Ore Offered

Philadelphia, Nov. 21.—Some additional lots of Indian manganese ore are being offered in the market, but no sales are reported. Prices of 65 to 70 cents, per unit, at tidewater, for 50 per cent, or better ore, continue to prevail. A considerable amount of Japanese manganese ore is being imported against old sales, but no new business now is being taken, as prices are prohibitive. This ore is of a very high grade quality and much of it has been going into the manufacture of various chemicals.

Bar Sellers Are Cautious

And Are Taking New Contracts in a Very Conservative Manner—Prices Are Advanced

Philadelphia, Nov. 20.—Extremely deliberate sales policies continue to be followed by the steel bar producers in considering the constant inquiry for this product for future contract or for nearby shipment from consumers in this territory. Only the cases of regular customers are being considered and each case is being judged on its merits. It is nevertheless the exceptional instance where new tonnage is accepted, the position of the makers being that they have not the steel to spare and cannot quote until they are certain they have any material to offer. It seems to be a problem how all the buyers can meet their needs since it is certain that a number still have to buy to round out their requirements during the next few months and there is considerable criticism of the present mill policy. Where any new business is taken on, it is usually at 2.70c, Pittsburgh, or 2.869c, Philadelphia, and some sales at this level within the week are noted. At least one large independent is holding for 3c, Pittsburgh, for first quarter. A jobber is inquiring for 3,000 to 3,500 tons for first quarter and another negotiation involves 600 tons.

Steel Bars Advance $2

Chicago, Nov. 21.—Almost the only feature in the steel bar market is the advance of $2 per ton, made effective last Saturday. This brings the quotation to 2.99c, Chicago mill, for indefinite delivery at the convenience of the mill, which practically means fourth quarter of 1917.

In spite of unusually high prices demand for steel bars continues strong, and buying is increasing rather than decreasing. Much inquiry is being received which cannot be entertained, and probably more tonnage of this sort is being refused than is being placed on mill books. This includes a heavy tonnage of steel to go into export, which is not being taken by western mills. The policy of most steel makers is to give domestic consumers first opportunity, and to refuse export tonnage as long as regular customers are not supplied. Inasmuch as export orders command several dollars per ton higher than domestic, this is an attitude which should be appreciated.

Hard steel bars rerolled from rails are advancing, and are now quoted at 2.65c to 2.75c, Chicago mill. A strong demand continues for this product, and it seems likely that 2.75c, mill, will be the minimum quotation in a short time.

Difficulty is being experienced by some mills in obtaining a sufficient supply of rails to continue operation. It is not a case of being unable to buy, but railroads are unable to deliver the material sufficiently fast in the present condition of car shortage. One mill in this district has been idle for more than a week on account of lack of material.

Out of Market

Buffalo, Nov. 21.—A leading producing interest is out of the market on iron bars, due it is stated partly to the shortage of scrap materials. Consumers of iron bars seeking to cover for their needs are facing advances of $5 to $7 per ton. Mills and agencies generally are now holding to a nominal minimum of 2.90c, base, on steel bars and small shapes. There is a reluctance on the part of sellers to quote any prices on tonnages for next year.

Steel Bars Put Up $4

Pittsburgh, Nov. 21.—Steel bars yesterday were advanced $4 a ton to 2.90c by the Carnegie Steel Co. and that figure now represents the bottom of the market for delivery at the convenience of the maker. Demand for bars continues very heavy. During the past week, inquiries for fully 60,000 tons of steel bars and billets came out for shipment abroad. Prospective buyers, however, have not found much encouragement in the Greater Pittsburgh district. Steel for the manufacture of munitions for the allies is wanted for delivery the first and second quarter of 1917.

Bar iron has been advanced to 2.90c by leading makers in Pittsburgh and its vicinity. It develops that puddlers working under wage scales of the Amalgamated Association will continue to receive advances in pay, amounting to 25 cents a ton for boiling, after the 2c bar iron card is passed. The published scale makes no provision for wage rates after the 2c bar iron card prevails.

Causes Little Comment

Cleveland, Nov. 21.—Announcement that the Carnegie Steel Co. had advanced prices of bars and shapes $4 per ton and plates $5, making the quotations 2.90c and 3c, respectively, on bars and shapes and 3.50c on plates, aroused little comment, as it is recognized that these prices are for delivery at the convenience of the mills and that prices for anything like prompt delivery are very much higher. Pressure for delivery continues unabated. Rerolled reinforcing bars are firmer and the usual quotations now are 2.65c to 2.75c, mill, with demand fair.

(*For complete prices see page* 1074.)

Bar Iron Advances

Chicago, Nov. 21.—An increase of $2 to $3 per ton in the quotation on bar iron has taken place during the past few days. A good inquiry exists, and mills are sold sufficiently far in advance that they are not anxious to obligate themselves with further tonnage, especially under the present situation as to scrap. Much inquiry is being turned down, and the business being placed is mostly among regular customers.

The present quotation ranges from 2.60c to 2.65c, Chicago mill, with the maximum applying in most cases.

Much Higher Prices

Cleveland, Nov. 22.—Owing to the scarcity of scrap and its high prices, very little bar iron is being manufactured in Cleveland, and prices are largely nominal, ranging from 2.90c to 3c. The Empire and Union rolling mills are rolling steel bars almost exclusively.

Hoops and Bands

Pittsburgh, Nov. 21.—Prices of hoops and bands have not been changed recently by the Carnegie Steel Co., although its quotations are regarded as nominal, owing to the fact that the company cannot promise material for delivery before July 1, next. One manufacturer in the Greater Pittsburgh district has sold hoops at as high as 4.10c and bands at 3.85c for rather prompt delivery.

Shafting Deliveries Improve

Pittsburgh, Nov. 21.—Deliveries of cold rolled steel shafting show further improvement this week. Some mills are offering material for shipment within the next 60 days. Prices continue to harden, but the 20 per cent off the list quotation has not disappeared. Material for shipment the second quarter of next year likely will command 10 per cent off the list.

Steel Chain

Pittsburgh, Nov. 21.—No prices below 5.50c for ⅜-inch proof coil steel chain have been reported recently. In fact, some makers have been quoting 6c and it is not unlikely that that figure soon will represent the market.

Ship Plates Very High

More Than $100 Per Ton Paid on Large Tonnages and Higher Quotations Are Expected—Foreign Demand Continues

Philadelphia, Nov. 20.—Additions still are being made to the extraordinary strength of the eastern plate market, both in prices and in demand. Ship yard requirements, both domestic and foreign, are exceedingly heavy and higher prices are being paid freely for deliveries from six to 18 months ahead. More than 5c, Pittsburgh, has been paid on large tonnages of ship plates and the great strength of the market has brought forth the predictions that 6c soon will prevail and that the ultimate price will be considerably higher. One eastern mill, in fact, has quoted 6c, Pittsburgh, on some lots of ship plates. Another large maker still refuses to make any new quotations on ship steel for the time being, but will ask not less than 5c when he again makes prices.

The Cramp yard was the buyer this week of 8,000 to 9,000 tons for two merchant boats, from an eastern mill, delivery at its convenience. Another eastern ship yard has out a new inquiry for 2,000 to 3,000 tons. There is a heavy export tonnage prevailing, including 14,000 tons for Canada.

Grades of plates other than of ship steel are growing stronger weekly. Ordinary tank steel, which has been irregular, is firming up under further active buying by the car builders, bridge shops and other consumers, and is hardening around 4c, Pittsburgh. The same may be said of universal plates, though car builders have been able to put through some tonnage at 3.50c and 3.75c, Pittsburgh. An eastern mill this week refused 4.50c, Pittsburgh, on 10,000 tons of tank plates for export for the last quarter of 1917. The buyer then offered 4.75c, Pittsburgh, without result. On 1,300 tons for first quarter, this same maker declined 5c, Pittsburgh, because he could not ship. Good sized orders for tank steel for six months' shipment are reported at 5c, Pittsburgh. Fair orders in flange steel for eight weeks' shipment also were placed at 6.15c, Pittsburgh.

A Spanish buyer, desiring to place 1,000 to 1,500 tons of boiler steel, has come to this country, hoping to interest the manufacturers in person, but when he visited the east this week, he was advised by one maker to come back around July 1, as no quotations could be made before that.

Prices Vary Widely

Buffalo, Nov. 21.—Selling agencies generally are quoting 3.50c, base, on plates, but one large producing interest has a range of 3.50c to 4.50c, showing a greater divergence in prices than has been noted at any previous time in the marketing of this almost unobtainable and much demanded product.

Plates Advanced $5

Pittsburgh, Nov. 21.—The Carnegie Steel Co. on Nov. 20 advanced its price of steel plates $5 a ton to 3.50c for shipment at its convenience. Other manufacturers are asking 3.50c or above for similar delivery. Since more important mills are unable to promise deliveries until the latter part of the second quarter of next year, quotations for forward shipment necessarily are regarded as somewhat nominal. Manufacturers in a position to meet specifications for shipment the early part of 1917 are asking 4c and above, although that figure recently was shaded on a rather small tonnage for delivery the first three months of 1917.

Demand for steel plates, if anything, is heavier than ever before. Car builders, ship builders and fabricators are urging mills for deliveries and considerable tonnage is being sold by warehouses to consumers who are unable to obtain necessary requirements from manufacturers. It is estimated that orders for about 7,000 cars have been placed in the last week or 10 days, including 2,000 box cars for the Chicago, Burlington & Quincy railroad and a similar number for the Illinois Central railroad.

Plate Demand Heavy

Chicago, Nov. 21.—No cessation of strong demand for steel plates, particularly those for shipbuilding, has manifested itself. An advance of $2 per ton has been made, bringing the present quotation to 3.54c, Chicago mill, but this has not had the effect of checking inquiry. Much of the business offered is for export, and this is not being considered as long as domestic users are still in the market.

Still Negotiating

Philadelphia, Nov. 21.—A meeting of representatives of the stockholders of the Thomas Iron Co. and of the syndicate of New York and Philadelphia capitalists which has made an offer for the properties of the former company, was held at Easton, Pa., Nov. 21, to promote the negotiations. As stated previously, it is learned that the deal has been progressing favorably and that a deposit of a sum which would represent the first payment in the event that the negotiations are brought to a definite conclusion, has been or is about to be made in a Philadelphia bank. The offer of the syndicate for the blast furnaces and other properties of the Thomas Iron Co. amounts to $3,500,000. A committee is conducting the negotiations in behalf of the stockholders and in view of the rapid improvement recently in the iron market, it is not yet certain that the shareholders will accept the offer of the syndicate when the proposition is laid before them finally for their ratification.

(*For complete prices see page* 1074.)

Tin Plate Mills

Have Sold Heavily and It is Difficult to Place Orders

Pittsburgh, Nov. 21. — Virtually no more tin plate tonnage is available for delivery the first six months of 1917. Several of the more important producers announce publicly that they have withdrawn from the market and prospective buyers say it is extremely difficult to obtain tonnage at any price. A few mills are in a position to offer additional tonnages and occasional reports are heard of sales at $7, base. For export, even higher prices are reported. The general tin plate market likely will offer no new developments until prices for shipment the second half of next year are considered. Mills are being driven at maximum capacity and most manufacturers will carry heavy tonnages, bought for 1916 shipment, over into 1917.

Nuts, Bolts and Rivets

Pittsburgh, Nov. 21.—Manufacturers of rivets last week advanced prices $3 a ton to 4.15c for structural and 4.25c for boiler rivets. Nuts and bolts were put up 5 to 7½ per cent. Makers now are asking an additional extra for tapping hot and cold pressed square and hexagon nuts. No formal changes had been made in prices of nuts, bolts and rivets for several months.

Cold Rolled Strip Steel

Pittsburgh, Nov. 21.—The bulk of the tonnage available for first quarter delivery has been disposed of by makers of cold rolled strip steel at prices ranging from 6.50c to 7c, base. So far as can be ascertained, no tonnage has been offered for delivery the second quarter of next year. Specifications against contracts and new demand are described as heavy.

Structurals for Ship Yards

Heavy Requirements for Extensions to Plants Along the Atlantic Coast—Prices Advanced by Leading Interests

Philadelphia, Nov. 20.—Heavy requirements of structural material for ship yard extensions either are in the market or their appearance is foretold by advance reports. The proposed enlargements of the New York Ship Building Co. plant at Camden are estimated at 10,000 tons; the Newport News Ship Building & Dry Dock Co. is closing for 2,500 tons for crane runways, which is only a part of large plans for this yard; the government will need 6,000 tons for a new machine shop at the League Island navy yard, this city, and additional tonnage for other improvements. The market is producing more tonnage than the mills care to take and the latter are accepting new business with discrimination. There is considerable inquiry for first and second quarter contracts which is not being accommodated except in occasional instances. One large independent, as the result of heavy new export orders, has practically withdrawn from the shape market for the time being.

There is a new export inquiry for 15,000 tons of miscellaneous shapes before eastern makers from British merchants. Large sales of shapes for export here have been made at well over 3.25c, Pittsburgh. Some eastern mills will not consider prices under 3c, Pittsburgh, or 3.159c, Philadelphia, and have been booking considerable business at this level. The price seems more uniform in the east, but makers in other districts have been doing 2.80c to 2.90c, Pittsburgh. The Southern railway, after holding up this matter for several months, has distributed about 5,000 tons of bridge work.

New Industrial Plants

Cleveland, Nov. 21.—Bids have been received for the new plant of the National Acme Mfg. Co., which will require about 2,000 tons of shapes. It is expected that the contract will be awarded within a few days. A new industrial plant to be built on Quincy avenue will require about 3,500 tons of structural material.

Shapes Now 3c

Pittsburgh, Nov. 21.—Under date of Nov. 20, the Carnegie Steel Co. advanced structural shapes $4 a ton to 3c for shipment at its convenience, which means "some time in 1917". Most mills are unable to entertain inquiries calling for delivery before May or June. Manufacturers able to ship material 60 or 90 days hence, are enjoying premiums ranging from $5 to $10 a ton. Fabricating shops are being operated at maximum capacity, although much complaint is heard about deferred shipments of structural material.

Shapes Up $2 at Chicago

Chicago, Nov. 21.—An advance of $2 per ton on structural shapes was made effective Saturday, bringing the quotation for delivery at convenience of the mill to 3.09c, Chicago mill. Demand for this class of finished steel continues excellent, and industrial and railroad work continue to take large tonnages, while a large aggregate of small contracts adds materially to the total. The largest tonnage let during the past week involves 1,200 tons, which the American Bridge Co. will fabricate for the Northern Pacific Railroad Co. for an extension to an ore dock at Superior, Wis. Other recent tonnages are much smaller.

CONTRACTS AWARDED.

Northern Pacific Railway Co., extension to ore dock at Allouez Bay, Superior, Wis., 1,200 tons, to American Bridge Co.

American Can Co., extension to plant at Maywood, Ill., 413 tons, to American Bridge Co.

Amalgamated Assn. of Street and Electric Railway Employes of America, building at Ashland boulevard and West Van Buren St., Chicago, 372 tons, to Wendnagel & Co.

Great Northern Railway Co., miscellaneous bridge work at various locations, 304 tons, to American Bridge Co.

Illinois Steel Co., structural steel required for raising two ore bridges at South Chicago, Ill., 218 tons, to American Bridge Co.

Minneapolis & St. Louis Railroad Co., deck plate girder span at Carver, Minn., 210 tons, to American Bridge Co.

Bridge work for the Southern railway for double-tracking in South Carolina, 2,500 tons, to the American Bridge Co.

Sugar mill in Cuba to the Belmont Iron Works, tonnage now increased to 2,300.

Mitler apartment, East Seventy-fourth street, New York City, 400 tons, to the Belmont Iron Works.

Addition to the Kings County Court House, Brooklyn, 300 tons, to the Guerber Engineering Co.

Garage, West Sixty-sixth street, New York City, 250 tons, to the Guerber Engineering Co.

National lamp works for the General Electric Co., Providence, R. I., 750 tons, to the Providence Steel & Iron Works.

Building for the Waterbury Farrell Foundry & Machine Co., Ansonia, Conn., 300 tons, to an independent shop.

Crane runway for the Raritan Copper Co., Perth Amboy, N. J., 450 tons, to an independent shop.

Addition to the Engineering building, West Thirty-ninth street, New York City, 400 tons, to the American Bridge Co.

Carson College for Orphan Girls, Philadelphia, 500 tons, to an independent bridge shop.

Bridge for the Lehigh Valley railroad, 200 tons, to the Bethlehem Steel Co.

Highway bridge, Philadelphia, 300 tons, to an independent shop.

CONTRACTS PENDING.

Reinforcement of the Poughkeepsie bridge of the New Haven railroad, 2,300 tons, bids being taken.

Bridge work for the Chicago, Northwestern railroad, 5,400 tons, bids being taken.

Large apartment, New York City, for unknown parties, 10,000 tons, bids being taken.

Machine shop for the League Island navy yard, about 6,000 tons, and other improvements requiring additional tonnage, bids about to be asked.

Extensions to the Atha plant of the Crucible Steel Co. of America, Harrison, N. J., 2,500 tons, bids being taken.

Two bridges for the Western Pacific railroad, 1,200 tons, bids being taken.

Boiler house for the New York Central railroad, New York City, 600 tons, bids being taken.

Proposed extensions to the plant of the New York Ship Building Co., Camden, N. J., estimated at about 10,000 tons, plans not yet issued.

Apartment for A. S. Cochran, West Fifty-eighth street, New York City, 400 tons, bids being taken.

Hotel for Bing & Bing, West Forty-seventh street, New York City, 600 tons, bids being taken.

Hearn Studio building, Fifty-ninth street and Sixth avenue, 800 revised bids being taken.

New plant National Acme Mfg. Co., Cleveland, 2,000 tons. Contract will probably be awarded this week.

(*For complete prices see page* 1074.)

Cast Iron Pipe

Large Award at Chicago Subject to Council's Approval

Chicago, Nov. 21.—Following advances of $1 and $3, a third increase in the price of cast iron pipe has been made, $2 per ton being the advance. This makes the present quotation on 6-inch and larger pipe $37 to $38 per ton, delivered Chicago, while on 4-inch pipe the quotation is $40 to $41 per ton. This is an advance of $6 per ton in slightly more than two weeks. Considerable business is being considered and recently has been placed with pipe makers. Bids were opened in Chicago last week on 15,000 to 18,000 tons of large size pipe, and the United States Cast Iron Pipe & Foundry Co. has been awarded 15,000 tons conditional on the city council approving the contract. The same interest has been awarded 1,000 to 1,500 tons at Duluth on the same condition, and is taking 100 tons for Pontiac, Mich. Bids will be opened shortly at St. Paul on 1,200 tons, and at Bay City, Mich., on 550 tons.

Scarcity of Sheet Bars

Is Very Serious and Sheet Market is Halted—Extraordinary Expedients Being Resorted to to Deliver Product

Youngstown, Nov. 21.—The sheet market in this territory has come practically to a standstill. Quotations serve mainly to indicate what the prices would be, if any was for sale. Such prices are: Black sheets, 4c to 4.50c; blue annealed, 3.75c and running toward 4c; galvanized, from 5.50c to 6.25c and up to 6.50c.

The lot of the purchasing agent who is trying to buy sheets is only less difficult than that of the sheet manufacturer who is trying to get sheet bars. Those manufacturers who have succeeded in buying bars are, in some instances, little better off than those who have not; for the successful buyers are able to land only a percentage, in some cases very small, of their promised supplies. One mill, for instance, for several weeks past, has secured only enough sheet bars to run for two days each week.

Sheet bar manufacturers, sheet manufacturers and sheet buyers are up against the same general conditions—shortage of cars and labor and the high cost of materials of production. Very little relief of any sort is in anything like immediate prospect. The best any one can do is to make the best of a difficult situation, and that is what the sheet trade is doing.

It was hoped that shut-downs by sheet mills, from one cause or another, would enable the sheet bar makers to catch up with deliveries, at least to regular customers, but the demands upon them have proved to be too great to meet. Present conditions are unparalleled in the annals of the sheet industry, and the end is not in sight.

All sorts of expedients are being employed to facilitate deliveries. One mill, unable to ship sheets over the railroad that ordinarily takes its business, loads its shipments upon auto trucks and carries them several miles to the freight yards of another railroad. Almost every sort of rail car except Pullmans is used for every kind of shipment.

There has been a greater demand for galvanized than for either black or blue annealed, but actual sales have been few, with some buyers not unwilling under present conditions to pay as high as 6.50c.

Black sheets are still in greater demand than blue annealed, but with little tonnage in the market at even as high as 4.50c. Inquiries for blue annealed are much in excess of the supply, at from 3.75c to 4c.

In a word, the law of supply and demand in the sheet business today is being exerted entirely upon the side of supply.

Forced Out

Canton, O., Nov. 21.—The few sheetmakers in this district who are at all in the market are being forced out of it by frequent shut-downs. Although there has been an appreciable relief from car shortage, it has become increasingly difficult to procure shipments from the sheet bar manufacturers. One plant here has been shut down for a week while its buyers vainly combed the market for available sheet bars. Prices of sheets, the quotations being merely nominal, are: Black, 4.50c; blue annealed, 3.75c; galvanized, 6c. Most inquiries are being turned down flat, and one mill will not reopen its books before the middle of next month.

Prices Advance

Pittsburgh, Nov. 21.—The American Sheet & Tin Plate Co. this afternoon advanced prices of bessemer black and blue annealed sheets to 4c, base, for the former, and 3.50c, base, for the latter. No. 28 gage bessemer sheets now are quoted at 4c; Nos. 3 to 8 gage blue annealed at 3.65c, and Nos. 9 to 16 gage blue annealed at 3.50c. No. 28 gage tin mill black are quoted at 4c by the American company. For open-hearth stock, the American company continues to ask $2 a ton above the price of bessemer material. No formal prices exist for galvanized stock, although it is not believed that 5.50c could be shaded. A Youngstown manufacturer is asking 4.25c for bessemer black sheets and it is not unlikely that the market soon will be established at that figure. Demand for all grades of sheets continues extremely heavy for shipment to domestic and foreign consumers.

Difficult to Buy Sheets

Chicago, Nov. 21. — Users of steel sheets are finding increasing difficulty in placing orders for further tonnage. Apparently mills are not able to obtain a sufficient supply of sheet bars or are already booked up to their capacity, and several are out of the market, refusing to take on further tonnage. The present market for No. 28 gage black sheets appears to be 4.19c to 4.44c, Chicago mill, while No. 10 blue annealed continue at 3.69c to 3.94c, Chicago mill. No. 28 gage galvanized are scarce and 5.19c, Chicago mill, apparently represents the market.

Conditional Sales

Cleveland, Nov. 21. — Local sheet manufacturers are still declining to quote and when they do so, make sales conditional upon ability to obtain sheet bars. When any quotations are obtainable, they reflect a decided trend upward.

(*For complete prices see page* 1074.)

Boiler Tubes

Have Been Advanced, Following Advance in Pipe

Pittsburgh, Nov. 21.—Under date of Nov. 21, the National Tube Co. distributed new cards showing a revision in the classification of some sizes of boiler tubes. Three and 3¼-inch and 3½-inch to 4½-inch tubes now are quoted at a basing discount of 46 per cent for less than carload lots, or from 5 to 6 points above the price provided by the last previous card, issued Nov. 1, last. A point is equivalent to about $2 a ton.

Although prices of wrought iron and steel pipe were put up Nov. 15, it is likely that further advances will be made by Dec. 1. It is obvious that the question of delivery is far more important to consumers than that of cost. Numerous pipe line projects have been abandoned, on account of the deferred shipments, some mills being unable to promise material in less than from six to 10 months. Several manufacturers now are quoting standard steel pipe at from $1 to $3 a ton above prices provided by the National cards of Nov. 15.

Warehouse Prices

Are Advanced on Sheets at Chicago and Cleveland

Cleveland, Nov. 21.—At the present time, warehouse prices are not in line with the advances made on mill prices by the Carnegie Steel Co., but owing to the fact that Chicago warehouse prices have not been advanced, no changes will be made in Cleveland, at least for a day or two, on shapes, plates and bars. Galvanized sheets have been advanced to 5.50c, or $5 per ton, and blue annealed to 3.90c for No. 10 or $3 per ton. Tin plate has been advanced $1 to $14 per box.

Stores Advance Sheets

Chicago, Nov. 21. — An advance has been made by Chicago warehouses on black and galvanized sheets, bringing the present quotation on No. 28 black sheets to 4.25c, Chicago, and on No. 28 gage galvanized to 5.85c, Chicago. Other warehouse products remain unchanged.

Scrap is Still Higher

Quotations Rapidly Moving Upward—Another Large Purchase of Rail and Ingot Crops by the Italian Government

Cleveland, Nov. 21.—Quotations of prices of iron and steel scrap are no sooner published than higher ones are established. A stronger market has not been witnessed in many years. Every grade of scrap is taking part in the upward move, those of the heaviest variety taking on the largest gains and the light grades affected to a diminished degree.

Consumers are buying material at fancy prices. Sales of heavy melting steel to a local steel works have been made at a range from $21 to $23, but the going prices would be more closely represented by $20 to $21, on cars, this city. Wrought scrap and No. 1 busheling also have been purchased heavily by mills. Hydraulic pressed sheet scrap, which has been hanging low, now is $17 to $17.50, this city.

It looks like a higher market may be expected. Shortage of labor to collect and prepare scrap to specifications, a marked decrease of the supply usually coming from the middle western states, and the terrific rate of the consumption of scrap, all point to possibly higher markets when these factors become capable of comprehension by the consumers and ordinary dealers.

Higher at Cincinnati

Cincinnati, Nov. 20.—Rolling mills are offering premiums for prompt shipments of heavy melting scrap. This material today is quoted from $19.50 to $20 per gross ton, f. o. b. Cincinnati, which is the highest it has been in this market in years. Demand for steel scrap continues greater than supply, which has caused the market to become very strong. Borings and turnings, which have been weak, due to supply being larger than demand, have strengthened a little. Cast borings are now given from $5.50 to $6, and heavy turnings from $6.75 to $7.25, all per net ton.

Italian Government Buys

Philadelphia, Nov. 20. — Another large purchase of rail and ingot crops and other remelting stock, which trade gossip places at 15,000 to 20,000 tons, has been made of an eastern tidewater works by the Italian government and the price is understood to have been about $25, mill. The buyer is to furnish the vessels. A continuing strong demand for practically all grades of old material has put up prices 50 cents to $1 a ton additional in the week. There have been further important sales of heavy melting steel at a new high price of $21, delivered. One Schuylkill valley maker closed for 10,000 to 15,000 tons. A New Jersey consumer also took some tonnage and another Schuylkill valley plant is reported to have been a buyer. Buyers are more disposed to take up offers of material at prices which they consider reasonable and the figures they will pay constantly are rising. Sellers are slower to commit themselves except on material actually in hand, as they are finding it more difficult to cover at a profit.

Chicago Scrap Still Rises

Chicago, Nov. 21.—In spite of the abnormally high levels to which iron and steel scrap have been raised in this district, further advances are being made constantly. With pig iron sufficiently far above the present level and demand continuing strong at the same time that the supply seems short, a general higher level is inevitable.

One factor having considerable effect on the market is shortage of freight cars. This is preventing deliveries on contracts in some instances and is also preventing free movement of material, which brings about a virtual shortage at many points.

Railroad offerings continue to be slack, partly on account of the car shortage, and partly because labor to gather and load scrap is difficult to obtain. The Soo Line offers 630 tons, George W. Jennings 100 tons, and the Chicago, St. Paul, Minneapolis & Omaha railroad, 650 tons.

Market Excited

Pittsburgh, Nov. 21.—The scrap market, which has fluctuated considerably since Jan. 1, last, has been gaining strength consistently the last couple of weeks and further advances in price appear imminent. Heavy melting steel, which commanded $17.50 early last January, only to drop to $15.50 by July 1, last, now is commanding as high as $23 a ton, and numerous people in close touch with the situation predict that as high as $25 or $27 a ton will be paid for this stock before the end of 1916. The trend of prices of most grades, since July 1, last, has been upward. Low phosphorus scrap, including plate and shape shearings and billet and bloom crop ends, have been sold at as high as $27 a ton. Rerolling rails are being held at $25 a ton by some concerns and other grades reflect similar strength.

Heavy Melting Scarce

Buffalo, Nov. 21.—Dealers of the district report that no tonnages of heavy melting steel are obtainable at present. While the local consumers are out of the market for the time being, the demand from other sections continues. Pittsburgh district, the valley and eastern Pennsylvania are all calling for scrap material. Prices have again advanced on heavy melting steel, low phosphorus billet and bloom ends, No. 1 railroad wrought, car wheels, machine shop turnings, heavy axle turnings and No. 1 busheling scrap. The dearth of heavy melting steel has occasioned an increasing demand for the cheaper grades of scrap and further advances in the prices of these appear likely.

Higher in South

Birmingham, Ala., Nov. 20.—The old material market has reached its strongest point during the past week, and prices on all class of scrap have materially advanced. Owing to great scarcity of scrap, dealers are refusing to quote further ahead than their expected supply will lead them. One dealer reports the sale of a car of old car wheels as high as $15 per ton f. o. b. car yards here. Strictly No. 1 machinery scrap is in great demand by the foundries throughout the south to be used in their mixtures calling for No. 3 foundry iron.

Trend is Upward

St. Louis, Nov. 21.—The general trend of scrap prices continues upward, and there appears to be no top to the market. The scarcity of old material is so pronounced that dealers are using extreme caution in offering any large tonnages to consumers. The mills are accepting everything offered at prices approximating the top of the market. Rerolling rails and railroad wrought scrap are especially scarce, and railroad offerings have been unusually light on these grades recently. Borings and turnings also are in demand, and while quotations on these grades have been low for some time, they now are bringing better prices. There are no railroad offerings before the market this week.

The Whitaker-Glessner Co., Portsmouth, O., has just completed a new office building of brick and steel construction. The new addition is 60 x 125 feet, three stories high, and cost $80,000.

(*For complete prices see page* 1074.)

Billets Scarce

Foreign Buyers Negotiate for Large Tonnages of Discards

Philadelphia, Nov. 20.—Foreign buyers have been negotiating with eastern Pennsylvania makers for large tonnages of shell steel crops and discards, and have received quotations of $37.50, mill, on round lots. The business still is pending. The discard market is stronger in the east and one mill refused an offer of $32.50, mill, for 5,000 tons from a domestic buyer. It is not believed anything under $35 to $40, mill, now can be done on this material. The current demand for billets for deliveries running into and through the second quarter continues active, but there are few offers of material, as makers have little to spare. Eastern quotations are $55, mill, or higher, on rerolling and $65 to $75, mill on forging steel. An inquiry for 1,000 tons of bessemer billets for export was current here this week. Certain eastern makers are understood to have closed for some large new tonnages of shell rounds and blooms, with foreign governments for the last half of 1917. One maker reports a foreign offer of $80, mill ,for 1,000 tons of wire rods, which was declined.

Mills Forced to Close

Pittsburgh, Nov. 21.—Many consumers of billet and sheet bars have been forced to shut down mills for periods ranging from an hour to several days, on account of the scarcity of semi-finished material. Despite the coming in of new capacity, the supply does not appear to equal the demand. Billets and sheet bars have commanded $55 a ton at the mill and reports are heard of sales at $57.50. A month hence, long-term contracts will be rewritten to provide for deliveries in the first quarter of next year. It will be recalled that fourth quarter material was sold at about $45 a ton. It is too early to hazard an opinion regarding the price for shipment the first three months of next year.

Gas Shortage

Cleveland, Nov. 21.—There is pronounced scarcity of billets and sheet bars, and on sheet bars of unusually high carbon, a quotation of $57 has been made. The delivery from one large producer on the Ohio river has been delayed on account of shortage of gas, which compelled the plant to cease operations for a number of days.

Cannot Catch Up

Youngstown, O., Nov. 21.—The demand for semi-finished material is so strong and so insistent that even the enforced shutting down of some finishing mills has not made it possible to catch up with deliveries. Careful inquiry fails to discover any buyer who is getting sheet bars at less than $55, and many of them have offered that price in an effort to secure enough steel to run their mills at capacity. These shut-downs range in time from several hours a day to periods of a week to ten days. While some sections report a slight relief from car shortage, there has not been enough change in this situation to help either the semi-finishing or the finishing mills greatly.

Some mills have bought sheet bars for the first quarter of 1917, but many will not readjust their contracts before the middle of December. Some sheet bar manufacturers will probably ask $55 for their first quarter output, while a few are talking of setting the price at $60.

Wire Nails

Are Expected to Advance Beyond Present High Prices

Pittsburgh, Nov. 21.—Although wire products now are selling at the highest prices to prevail for many years, manufacturers express the belief that material will sell on the basis of $3 a keg for nails, before buying for spring distribution begins. It is not at all unlikely that leading makers will put up prices Dec. 1. Specifications against contracts are decidedly heavy and mill managers literally would be snowed under if it were not for the pursuance of extremely conservative sales policies. The sales officials of most concerns are cutting down new orders 50 per cent and some concerns are refusing to book contracts calling for delivery over more than 30 days.

Out of Market

Pittsburgh, Nov. 21.—Most makers of bessemer ferro-silicon have withdrawn from the market, having no additional tonnage to offer for delivery before April 1, 1917. Ten per cent material is listed at $35, furnace. Eighty per cent ferro-manganese is being held at from $160 to $165, seaboard or delivered, but the market in this district is quiet. Other ferro-alloys and steelmaking metals show no change in position.

The Pittsburgh Instrument & Machine Co., manufacturer of testing instruments, will move from 236 Third avenue to 101 Water street, Pittsburgh, Dec. 1.

(*For complete prices see page* 1074.)

Noted Engineers

Talk on Co-operation and Nitrate Plant Before Cleveland Society

Several prominent engineers met in Cleveland last Tuesday to discuss plans for effecting a national solidarity of the engineering profession and for broadening the influence of the engineer upon matters of public importance. The committee's report will be presented at the third conference on engineering co-operation to be held soon in Chicago. Among the engineers who were present at this conference and who talked to the members of the Cleveland Engineering Society at its regular meeting Tuesday night were Prof. F. H. Newell, of the University of Illinois, who talked on "A Practical Plan for Co-operation", and Hunter McDonald, chief engineer of the Nashville, Chattanooga & St. Louis railroad, who told why engineers of the south are in favor of having the $20,000,000 government nitrate plant located at Muscle Shoals, Tenn.

Isham Randolph, who was to talk on "What the Established Professional Man Owes the Beginner", was prevented from being present by illness. The secretary of the society read Mr. Randolph's paper, which pointed out the value of precept, example and sympathetic aid to the embryo engineer. The paper was unusually interesting and was interrogated with occasional bits of verse writen by the author. In his remarks on co-operation, Professor Newell emphasized the need of mutual assistance on the part of the individuals—not so much to strengthen the societies themselves, but to assist the members when they are in need of employment and to assuage the cruelty of the present dead line of old age. The effort of the individual is needed to improve the engineer's social relations and to bring about appreciation of his work by the public. Civic conditions may be bettered by the engineer who is eminently fitted to be a determining factor in the making of laws. Mr. Newell's concluding thought was that the engineers must establish a code of ethics to protect themselves from those who would wantonly commercialize the profession.

Hunter McDonald presented the arguments prepared by the national section of the engineering associations of the south, pointing out why Muscle Shoals, Tenn., is a suitable location for the government nitrate plant. Mr. Hunter used a number of lantern slides to help clinch his arguments. One of the main reasons why this

plant should be located in this district is, he said, that the south is the largest consumer of fertilizer and is also the largest producer of cotton, which is so essential for the manufacture of explosives. Other factors which are in the favor of the Muscle Shoals location of the nitrate plant are the proximity of coal, limestone and phosphates, the assurance of cheap, reliable power and desirable traffic conditions.

Shell Steel Orders

Calling for Fully 1,500,000 Tons Have Been Distributed

New York, Nov. 21.—Distribution by the allied governments through J. P. Morgan & Co. of the tremendous orders for blooms and bars for shell steel manufacture for delivery over the last six months of 1917, which have been under negotiations for the past several weeks, now has been made. While it is known that the full tonnage which the individual makers at the instance of the buyers had signified they could take on at a price was not accepted in all cases, the major portion of the offerings has been absorbed and it is estimated that the total amount purchased has been not less than 1,500,000 tons. This tonnage compares well with that purchased for the first six months of 1917 and, if anything, it is greater. One large eastern producer received about 200,000 tons, another maker about 150,000 tons, while it is stated in current reports that the Steel Corporation's share has been upwards of 500,000 to 750,000 tons.

The matter of prices has been more or less guarded, but it is learned that a considerable part of the tonnage, at least, was closed at from 4c to 4.25c, mills, as against perhaps 3c to 3.50c, mill, on similar contracts for the first six months up to July. It is understood, however, that some producers accepted orders under 4c, mill. While the distribution, in large, has been completed and the signing of formal contracts is being carried out, some miscellaneous lots of shell steel still are to be closed, and these are the subject of present negotiations. One of these matters involves about 40,000 tons for shipment after July. The heavy buying of shell steel now concluded will tie up a large portion of the free capacity of the participating makers for the calendar year of 1917 and will restrict their offerings to the domestic trade except where provision previously had been made by reservation or definite orders to take care of the requirements of regular customers.

Coke Buyers

Refuse to Place Orders and Quotations Decline Somewhat

Pittsburgh, Nov. 21.—With some of the larger consumers refusing to figure in the coke market on account of abnormally high prices, quotations for spot delivery have declined somewhat this week. The spot market dropped from $7.50 to $6 a ton for furnace coke a few days ago, but sales at as high as $6.75 a ton were reported this morning. It is apparent that the coke market cannot be controled entirely by either consumers or sellers. Normal conditions are not expected to exist until the labor supply and the car situation become more satisfactory. Furthermore, demand for coke recently has exceeded the supply. Reports of sales of contract furnace fuel at $4.25 are heard, but not confirmed. Foundry coke for spot shipment has commanded as high as $10 a ton this week, and $6.75 a ton is being paid in many instances for future delivery. *The Connellsville Courier*, for the week ending Nov. 11, says production was 421,513 tons, compared with 408,282 tons the week before.

Some Improvement

Philadelphia, Nov. 21.—A practically day-to-day market appears to exist in spot coke at the present time and prices, accordingly, show a considerable spread as the immediate supply contracts or expands. In this district, a spot lot of 10 cars of Connellsville furnace coke was done this week at $7, ovens, and there also were small lots placed at $7.75, ovens. Improvement in the situation is reported by furnace interests which have been obliged to bank certain stacks. The Thomas Iron Co. has resumed operations with its two banked furnaces. Connellsville foundry coke has been selling at from $9 to $9.50, ovens, with up to $10.50, quoted. The bituminous coal market has been erratic with spot prices ranging from $5 to $7, at the mines for run of mine.

Delivery Very Slow

Cleveland, Nov. 21.—Car shortage continues to make the delivery of coke extremely slow, and many foundries have all they can do to keep in operation. The usual quotation on prompt foundry coke is from $9.50 to $10, and the latter price has been frequently paid without complaint.

Uncertain at Cincinnati

Cincinnati, Nov. 20.—The coke market continues very uncertain. Dealers cannot supply demand for spot shipment fuel, because of the scarcity of coke and the lack of railroad equipment in which to ship it. A good demand is out from both furnaces and foundries, for small lots for spot shipments to fill in between deliveries on old contracts. Tentative prices are given for contract shipment, but practically no coke is to be had for that delivery.

By-Product Coke

St. Louis, Nov. 20.—No large inquiries are out for coke, but the demand for prompt shipment of small tonnages is fair, and the by-product producers are becoming able to supply it. Connellsville foundry grades are held at $9.50 to $10 a ton, Virginia foundry grades at $9 to $9.50. By-product producers are not making any prices except upon application.

New By-Product Ovens

Birmingham, Ala., Nov. 20.—The Woodward Iron Co., Woodward, Ala., has announced its intention of installing 60 additional Koppers by-product coke ovens, which will make a total of 200 ovens, producing about 1,000,000 tons of coke per annum. The cost of installation of this battery of ovens and accessories will be about $750,000. At the present time, this company is operating its 140 by-product ovens and several hundred old beehive ovens, and yet is a buyer of coke on the open market. These 200 ovens will be capable of producing the entire needs of the company in the future.

(*For complete prices see page* 1074.)

Fluor Spar Scarce

Pittsburgh, Nov. 21.—Virtually all sellers of washed gravel fluorspar have disposed of their entire output for 1917. Material has been quoted at from $7 to $7.50 a net ton at the mine. It appears as if many consumers would not be able to cover requirements fully. Mines in the Illinois field now are operating at maximum capacity, after a shutdown, due to a general strike.

Vessels Building

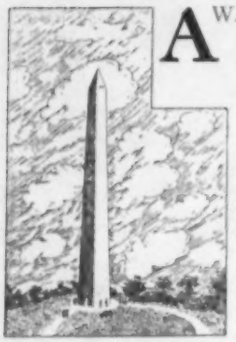
Washington, Nov. 21.—Builders' returns to the bureau of navigation, department of commerce, show that steel merchant vessels building or under contract to be built in private American ship yards on Nov. 1 numbered 417 of 1,479,946 gross tons, an increase of 25,676 tons over the returns from Oct. 1. During October, American yards finished 17 steel merchant vessels of 52,491 gross tons and made new contracts for 17 steel merchant ships of 77,877 gross tons.

J. R. Holcomb has been appointed superintendent of the Wilmington Steel Co., Wilmington, Del., vice W. J. Stoop, resigned.

Business News of Nation's Capital

Navy Department Makes Awards for Fourteen Torpedo Boat Destroyers and for Armor Plate for Four Battleships—Then Daniels Pats Himself on the Back

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, D. C., Nov. 21.



AWARDS have been made by the navy department during the past week for 14 torpedo boat destroyers, and for armor plate for four battleships. Eight of the destroyers went to the Fore River Shipbuilding Corporation at $1,160,000 each, and six to the Union Iron Works Co., four at $1,190,000 each, and two at $1,185,000 each. Four had previously been awarded to the Bath Iron Works, leaving two of the 20 yet to be awarded. It has not been determined whether these two will be given to a private builder or to a navy yard for construction. In the event the William Cramp & Sons Ship & Engine Building Co. can be induced to revise their bid on destroyers so that it will come within the appropriation, the contract for the two destroyers will go to that company. It is understood that the matter has been taken up, but the result of the inquiry has not been announced. Recommendation for the award of the two destroyers is said to have been made, however.

The armor contracts were announced yesterday, two battleships each going to the Bethlehem Steel Co., and the Carnegie Steel Co. Contracts for armor for the four battle cruisers will not be made until bids for these vessels are opened on Dec. 6.

The armor contracts for the four battleships follow:

The Bethlehem Steel Co.: 14,479.2 tons of Class A-1 armor at $420 a ton; 820 tons of Class A-2 armor at $485 a ton; 602 tons of Class B armor at $466 a ton. Besides the necessary armor bolts for this amount of armor.

The Carnegie Steel Co.: 14,479.2 tons of Class A-1 armor at $425 a ton; 820 tons of Class A-2 armor at $486 a ton; 602 tons of Class B armor at $460 a ton.

Accompanying the announcement of the armor awards, was the following statement which was issued by Secretary Daniels:

"The last prices paid prior to March, 1913, (for the battleship PENNSYLVANIA) were $454, $518, $496 and $548 for classes A-1, A-2, B and C armor respectively. It was when these identical figures were submitted by all three armor manufacturers the first time armor bids were opened under this administration that Secretary Daniels protested against the lack of competition, rejected all bids, and finally obtained reductions which have already saved the government $1,110,084. The saving effected on the armor for these four new ships will further increase the savings on armor to about $2,000,000 or, in other words, $2,000,000 more would have been required for the construction of these vessels if the exorbitant demands of the armor manufacturers had been accepted."

Mr. Daniels' perennial contention about saving money in connection with armor plate awards, it is held, comes with poor grace in this instance particularly. Despite the increased cost of labor and materials, manufacturers sought to make the navy department the best possible prices out of loyalty, and perhaps with no idea of any profit. However, the fact that this, the largest armor tonnage ever awarded, will afford capacity operations of armor plate mills will mean a great reduction in overhead charges, making it possible to quote the lower figures.

Mr. Daniels had a three-day conference last week with ship builders regarding bids they submitted as to destroyers, battleships and submarines, and endeavored to have them make them more direct, so that awards could be made. They were in most instances accompanied by numerous conditions, which were prompted by the situation as to labor and material markets. The conference ended satisfactorily so far as all of the remaining awards, except two destroyers, were concerned and it was therefore possible to make the destroyer awards. It is known also that the conference as to the battleships bids resulted in straightening out the situation considerably. It finally was sifted down to the matter of supplying electrically driven machinery. Builders in their bids asked that the department assume the responsibility for securing this machinery in sufficient time. Mr. Daniels thereupon called in the electrical manufacturers and as a result succeeded in having the Newport News Shipbuilding & Dry Dock Co. agree to contract directly with an electrical company for the machinery, penalty for delay of delivery to rest upon the latter. The Newport News company will, as a consequence, probably be given two of the battleships. The New York Shipbuilding Co. also is considering a similar agreement and if it does offer to contract directly for the machinery, probably will get a contract for the remaining two ships. Mr. Daniels said he might be able to make battleships awards today or tomorrow.

A second conference will be held tomorrow as to contract for 29 submarines. The scout cruiser situation, the most serious of all, seems to remain unchanged. It is evident the department does not want to turn over to navy yards the responsibility of building these scout cruisers. Four are included in the 1917 building program. All of the bids on them, except that of the Seattle Construction & Dry Dock Co., exceeded the limit of cost set by congress. It is believed the Seattle company will be awarded the contract for one cruiser in accordance with its bid, which was direct and within the limit of cost. Mr. Daniels said it might be necessary to go to congress regarding the scout cruiser situation. He pointed out, however, that he would not know how much more money would be needed to have private yards build the cruisers. It might be determined to ask congress to permit awards for the cruisers on a basis of cost of construction plus a reasonable profit.

Bids on Shells

Washington, Nov. 21.—The following bids have been received by the bureau of ordnance, navy department, for 4,800 14-inch armor piercing shells and 2,800 Class B 14-inch projectiles:

Midvale Steel & Ordnance Co., 2,000 14-inch $535 each, 500 14-inch Class B $332 each.

Bethlehem Steel Co., 3,000 14-inch $545 each, 2,800 14-inch Class B $310 each.

Crucible Steel Co., 3,000 14-inch $539.50 each, 500 14-inch Class B $308 each.

Washington Steel & Ordnance Co., 1,000 14-inch Class B $320 each.

Bids for 50 sets of 4-inch gun forgings have also been received as follows:

Midvale Steel & Ordnance Co., 50 sets 40¼c per pound.

Bethlehem Steel Co., 50 sets 39c per pound.

Erie Forge Co., 50 sets 39c per pound.

Crucible Steel Co., 10 sets 38c per pound.

The Provincial Hydro-Electric Commission has awarded the contract for 1,000 tons of steel for transmission line standards on the line from Dundas to Toronto to the Canadian Bridge Co. The amount involved is about $110,000.

Advance in Ore Prices

Will Probably be Between $1.25 and $1.50 Per Ton—Ore Carrying Rate Advanced to $1 Net from Head of the Lakes

The ore carrying rate from ports at the head of Lake Superior for 1917 has been established at $1, net, an advance of 50 cents over the rate for 1916. Although earlier in the season an advance of 25 to 35 cents was talked of, it has been recognized for some time that in all probability the advance would be 50 cents and the action of several leading shippers in making contracts for the season at $1 a ton net caused no surprise. Most of the vessel tonnage has already been tied up and it is probable that the contracts which have just been made will govern on a very large percentage of the business to be done, but some vessel owners are holding a part of their tonnage in reserve with the expectation that they will be able to place it at a wild rate higher than the season rate.

The new rate is equivalent to $1.10, gross, the highest rate which has prevailed since 1900, when the contract rate was $1.25, while the wild rate for that year averaged 84½ cents. The gross rates for other years since 1900 have been as follows: 1901, 84 cents; 1902, 76 cents; 1903, 83 cents; 1904, 70 cents; 1905, 76 cents; 1906, 75 cents; 1907, 75 cents; 1908, 65 cents; 1909, 65 cents; 1910, 70 cents; 1911, 60 cents; 1912, 50 cents; 1913, 55 cents; 1914, 50 cents; 1915, 50 cents. The vessel men feel that they are entirely justified in the new rate on account of the increased costs of operating, including higher wages and high cost of coal and other supplies.

The starting of the iron ore selling movement for next year's delivery has been delayed while awaiting the fixing of the ore carrying rate, and it is probable that within a few days the new prices of iron ore will be determined. The feeling among ore men is strong in favor of an advance of at least $1.25 per ton, and some are in favor of an advance of $1.50. It is probable that the new rate will be somewhere between $1.25 and $1.50. Iron ore interests figure that their additional costs will be at least 85 cents, including 50 cents advance on carrying and 35 cents due to higher wages, larger royalties and other increased expenses. They argue that an advance of $1.25 to $1.50 is justified by present conditions and say that buyers express a willingness to pay any reasonable price this year. Furnace men recently interviewed by representatives of the leading Cleveland iron ore interests have not expressed much interest in the price, but stated their willingness to pay the going rate.

October Gains

In Awards of Structural Material—Railroad Buying

New York, Nov. 21.—October's total awards in structural steel in the country gained approximately 33,500 tons over September and were 132,500 tons in that period, or 77 per cent of shop capacity, according to the statistics of the Bridge Builders' and Structural Society. The September showing was 99,000 tons, or 52½ per cent.

The monthly statistics of the Bridge Builders' and Structural Society, showing the percentage of capacity contracted for and the approximate tonnage reported, are as follows:

Month.	Per cent.	Approx. tonnage.
October, 1916	77	132,500
September	52½	99,000
August	64	110,000
July	47½	83,600
June	58	100,000
May	80	137,000
April	72½	125,000
March	102	175,500
February	75	129,000
January	69	119,000
December, 1915	121	208,000
November	105	180,000
October	78	135,000
September	67	115,000
August	85	146,000
July	86	148,000
June	80	138,000
May	61	105,000
April	62½	107,500
March	64	110,000
February	30	51,000
January	25	43,000
December, 1914	35	60,000
November	20	35,000
October	35	60,000
September	38½	65,000
August	27½	48,000

Large railroad undertakings in structural steel continue to appear. The bridge inquiries of the Lehigh Valley railroad covering about 20 spans now are up to 7,000 to 8,000 tons, and about 25 more structures still are to be offered weighing probably 10,000 tons. Roads which had held off from buying because of the high prices when quoted several months ago, now are rushing into the market at much higher figures. A 10,000-ton apartment, New York City, is under negotiation. Other new work in this district is only of fair volume. With the adoption by the Steel Corporation of the 3c, Pittsburgh, price which had been quoted by some independents, the market on plain material is being established at that figure, or 3.169c, New York. Some quotations of 2.90c, Pittsburgh, however, still are current.

Wage Advances

Announced by Steel Corporation and Youngstown Companies

New York, Nov. 21.—Another advance of 10 per cent in wages to the employes of the United States Steel Corporation effective Dec. 15, was announced by Chairman E. H. Gary, this afternoon. This is the third advance of equal amount since the present movement of prosperity in the iron and steel industry began, making the total addition in wages of employes about 33 per cent, net.

Judge Gary's announcement is as follows: "Ordinarily the question of wages would not come up for consideration or decision at this time of the year, but in consequence of the abnormal conditions now existing, it has been decided to increase the wage rates of our iron and steel companies about 10 per cent to take effect Dec. 15. As to other departments, increases will be equitably proportioned."

All Advance

Youngstown, O., Nov. 22. (By wire.)—Presidents of all the steel companies in the Youngstown district announced today that they will increase wages of employes to meet the advance made by the United States Steel Corporation.

Demurrage Rates

Washington, Nov. 21.—The interstate commerce commission entered an order yesterday suspending from Dec. 1 and later dates, tariffs filed by railroads throughout the country making greatly increased car demurrage rates.

The present demurrage charge of practically all lines is $1 per day after free time. The proposed charges after free time allowance are as follows: $2 for the first day, or fraction thereof; $3 for the second day, or fraction thereof; $4 for the third day, or fraction thereof; $5 for the fourth and each succeeding day, or fraction thereof.

New Stack is Blown In

The new blast furnace of the United Furnace Co., Canton, O., was blown in Nov. 22. Its daily output is to be about 450 tons. A by-product coke oven and benzol plant is practically completed. The whole plant covers 360 acres. The frontage, along the Pennsylvania railroad, is about a mile in length. The new furnace will supply hot metal to the United Alloy Steel Corporation.

Rail Buying

Follows Quickly the Advance of $5 for Delivery in 1918

New York, Nov. 21.—With the new rail price definitely fixed, many roads during the past week have come into the market for their 1918 requirements and a heavy tonnage now is pending. One independent mill alone reports inquiries of from 175,000 to 200,000 tons from different roads and all makers are having presented to them requests for reservations or definite sales. The New York Central lines are in the market for their usual requirements, 150,000 tons or more, but the Pennsylvania system has not yet inquired. Despite the heavy inquiry for rails, most of the mills have been going slowly in closing orders and very few sales are reported. Some of the independent makers, in fact, still show a disinclination to adopt the $40 and $38, mill, prices named by the Steel Corporation, and some of them maintain that these prices are too low in view of the values prevailing for other forms of rolled steel. It is expected, however, that eventually all mills will take care of the needs of those roads which are dependent upon them for supply and at the new prices.

Oft-mentioned buying of cars and locomotives by the Russian government now is reaching some definite conclusions and some orders have been awarded. Distribution of additional cars has been made, 1,000 of which have gone to the American Car & Foundry Co., but the full amount of the purchase has not been announced. Of the 1,000 inquiry for locomotives, 100 have been distributed, of which 40 went to the Baldwin Locomotive Works, 40 to the American Locomotive Co. and 20 to the Canadian Locomotive Works. The New York, Chicago & St. Louis railroad has placed 25 locomotives and the Birmingham Southern four locomotives with the American Locomotive Co.

Domestic roads continue freely to place orders for cars and a number of additional awards remain in the week. Pending lots aggregate 10,000 to 15,000.

Rail Buying Starts

Chicago, Nov. 21.—The announcement last week of an advance of $5 per ton on standard section steel rails, bringing bessemer rails to $38, and open hearth rails to $40 per ton, has opened the books of rail makers to orders for 1918 delivery. On the announcement being made, steel companies which roll rails notified railroads that while orders for rails at these prices are not sought, as the steel can be disposed of at much higher prices, their requirements for 1918 should be made known at once and placed upon mill books. Rail business is not being solicited, as the price is not attractive, but all roads will be protected for their necessities through 1918.

It is believed that 50,000 to 60,000 tons have been booked by a western mill since the new price was announced.

Light rails have been advanced $4 per ton on all sections except the 8-pound rail, which has been advanced $5 per ton. This brings the base on light rails of 25 to 45 pound section to $44 per ton.

Much Car Inquiry

Chicago, Nov. 21. — Car buying continues to be slow, although a large number of cars are being inquired for by various railroads. The inquiry now current includes the following: Missouri, Kansas & Texas railroad, 1,000 box cars and 1,000 stock cars; New York Central railroad, 1,000 gondolas; Duluth, South Shore & Atlantic railroad, 100 hoppers; the Atlantic Coast Line, 100 stock cars; Great Northern railroad, 1,000 box cars, 500 refrigerators, 500 automobile cars, 500 stock cars; the Russian government, 4,000 box cars; Chicago, Rock Island & Pacific railroad, 2,000 gondolas, authorized by the federal court.

Bethlehem Buys Ferro

The Bethlehem Steel Co. again is in the market for 1,000 to 2,000 tons of 11 to 12 per cent ferro-silicon. The larger buyers of 50 per cent ferro-silicon have not yet covered for the first half of 1917 and the asking price of $100, furnace, by makers, therefore, is untested on tonnage lots.

The Non-Ferrous Metals

Copper **Lead** **Spelter** **Tin**

New York, Nov. 21.—Demand for copper has continued the leading feature of the metal market during the week closing today. Some of the copper business has come from abroad but most of it from domestic consumers, and most of the buying has involved shipment during the first half of 1917, although large commitments already have been made for the third quarter. Electrolytic copper now is exceedingly scarce for delivery over any part of the first half and some first hands no longer are quoting anything prior to third quarter. Indications now are that consumers who a week ago were short on their requirements, have covered themselves, with the result that demand no longer is of such an excited character. At the same time, a fair amount of buying continues to be reported each day, with the result that prices still are moving upwards. Electrolytic is quoted as follows: November and December 33.50c to 34c, cash; first quarter 32.50c to 33c, delivered 30 days; second quarter, 31.50c to 32c, delivered 30 days; third quarter 30.75c to 31.25c, delivered 30 days. Medium grades of lake copper are quoted at 33.50c to 34c, delivered 30 days, for this year's shipment, and 32.50c to 33c, delivered 30 days, for first quarter of next year. Casting copper is scarce and is quoted at 31.50c to 32c, cash, for November and December and 31c to 31.50c, cash, for January.

The spelter market has been featured by an active demand, and by some unusually large transactions last Friday and Saturday, including a number of sales involving several million pounds each. Brass special spelter is in greater demand than for a long time past, with the result that premiums for this grade are advancing. Sales already have been made at 1c to 2c above the price of prime western, but brass special continues available in some quarter at a premium of 1c. High grade is not sharing proportionately in the demand, with the result that most high grade brands are selling for next year at 15c to 17c. Prime western now is quoted as follows: Prompt and November, 12.37½c to 12.50c, St. Louis; December, 12.25c to 12.37½c; first quarter, 11.87½c to 12.12½c; second quarter, 11.50c.

The lead market is strong, although demand continues quiet. Outsiders now are selling at 6.90c and 6.92½c, St. Louis, and in some cases are asking 6.95c and 6.97½c. The outside market is quoted at 6.90c to 6.92½c, St. Louis, and 7c to 7.10c, New York. The American Smelting & Refining Co. continues to quote 7c, New York, but in some quarters of the trade an advance is expected.

An improved demand for aluminum, combined with the scarcity of this metal for prompt and nearby shipment, resulted in higher prices last week. At present the market is quiet but strong and quotations on prompt and nearby carloads are as follows: No. 1 virgin 64c to 66c; No. 1 remelted 60c to 63c; No. 12 alloy 46c to 47c.

Demand for antimony the latter part of last week and yesterday was fairly active and a considerable quantity of the metal both for spot and future delivery was sold at advancing prices. Today the market is quiet. The producers all are strong holders and in most cases refuse to quote on large lots, either spot or futures. The market on spot antimony is quoted at 14.50c, duty paid, while the leading producer has sold December-January shipment from China at about 13c, in bond.

The tin market, due to fears over the shrinkage of stocks in this country, has been featured by an active demand of late. It now is estimated that of arrivals at Atlantic ports during November, only 1,200 to 1,300 tons will be available for deliveries this month. At the same time, cable advices indicate that continued difficulty in securing licenses from the British admiralty for exporting the metal to this country will be encountered over the indefinite future. Today's market was 45.25c on spot Straits and 44.62½c to 44.75c for spot Banka.

(*For complete prices see page* 1074.)

Builds World's Largest Plate Mill

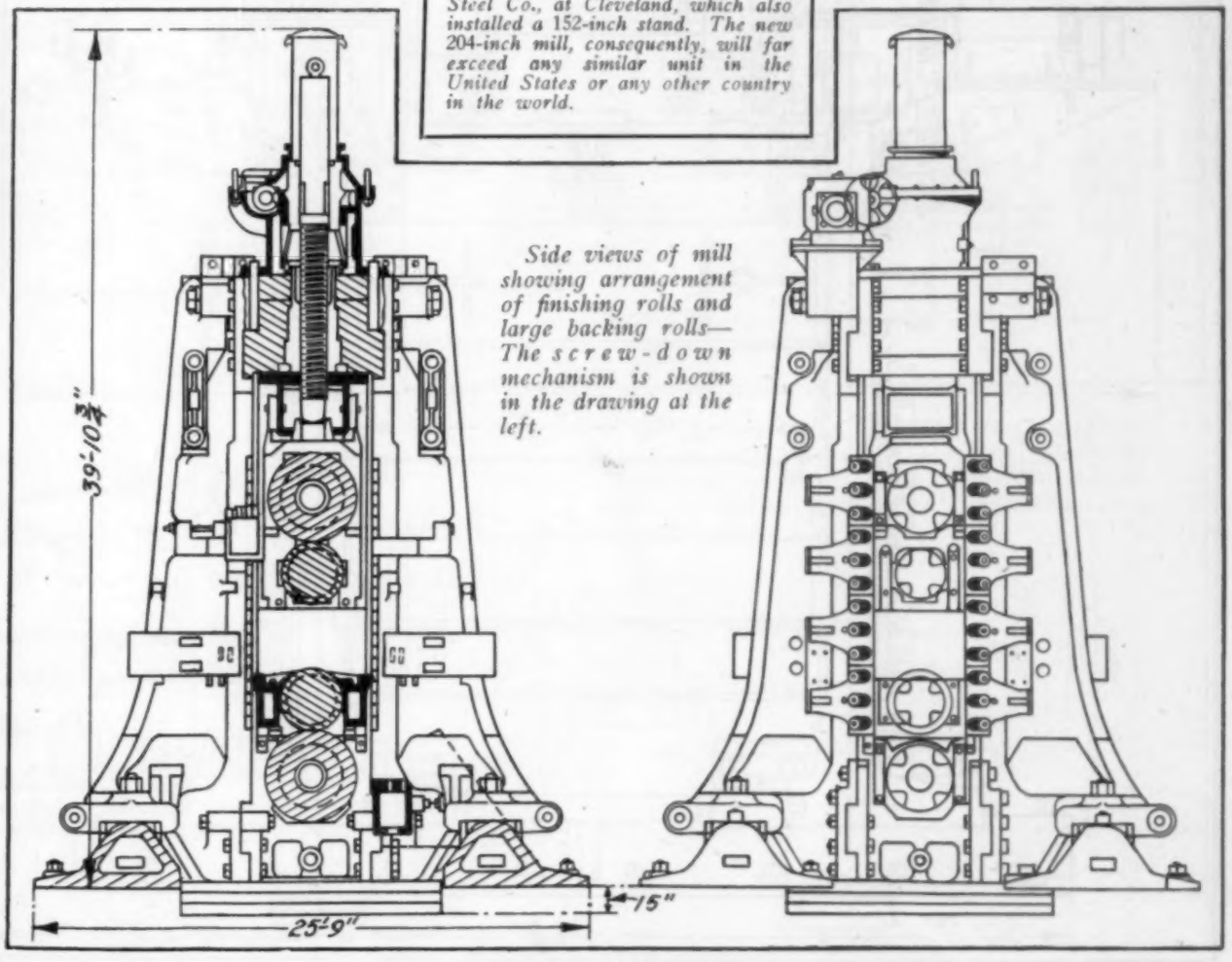
In Overcoming Construction Difficulties, the Designers of the New Mill for the Lukens Iron and Steel Co. Have Introduced Many New and Noteworthy Features

COATESVILLE, PA., long renowned for the prominent and historic part it has played in the development of the plate industry of the United States, is about to make a new bid for distinction in this field of manufacturing enterprise. At the works of the Lukens Iron & Steel Co., in that city, there is under construction at the present time a new mill for the rolling of steel plates which will far surpass in capacity any similar unit in the world, and in its general design and operating features will be unique in the rolling mill industry of the United States. The new mill will be of the 4-high reversing type, and 204 inches, or 17 feet, in size, capable of rolling plates up to 192 inches in width. It will exceed by a wide margin the 178-inch mill in the Witkowitz works in Austria, the 168-inch mills which are the present limit of the 2-high plate stands in the British Isles, and the two 152-inch mills which today are the largest in the plate industry of this country.

More than a century of progressive and specialized development of manufacture by a single works as well as the rebirth of the American ship building industry will be typified in the new mill. Since 1810, when the crude water-driven mill was established along the Brandywine at Coatesville representing the seed from which has grown the expansive works of today, the Lukens Iron & Steel Co. has devoted its attention to the manufacture of iron and steel plates of all descriptions and for all classes of service. Its active specialization in this line of production has dated from early in the first quarter of the nine-

Maintains Record for Largest Mill

When the new 204-inch mill is installed, the Lukens Iron & Steel Co., for the fourth time in its history, will have the largest plate mill in the United States. In 1890, the company began operations with a 120-inch sheared plate mill, which was then the largest of its kind. Subsequently, this mill was surpassed in size by a new mill installed in another plant. It was then rebuilt to 134-inch size, which regained for it the first position in the country. The advent of a new 136-inch mill temporarily deprived the Lukens company of the distinction of operating the largest mill. This was restored in 1903, when the present three-high, 140-inch unit was put in service. Worth Bros. Co., also at Coatesville, then took the lead with a 152-inch, three-high mill, only to share it later with the Otis Steel Co., at Cleveland, which also installed a 152-inch stand. The new 204-inch mill, consequently, will far exceed any similar unit in the United States or any other country in the world.



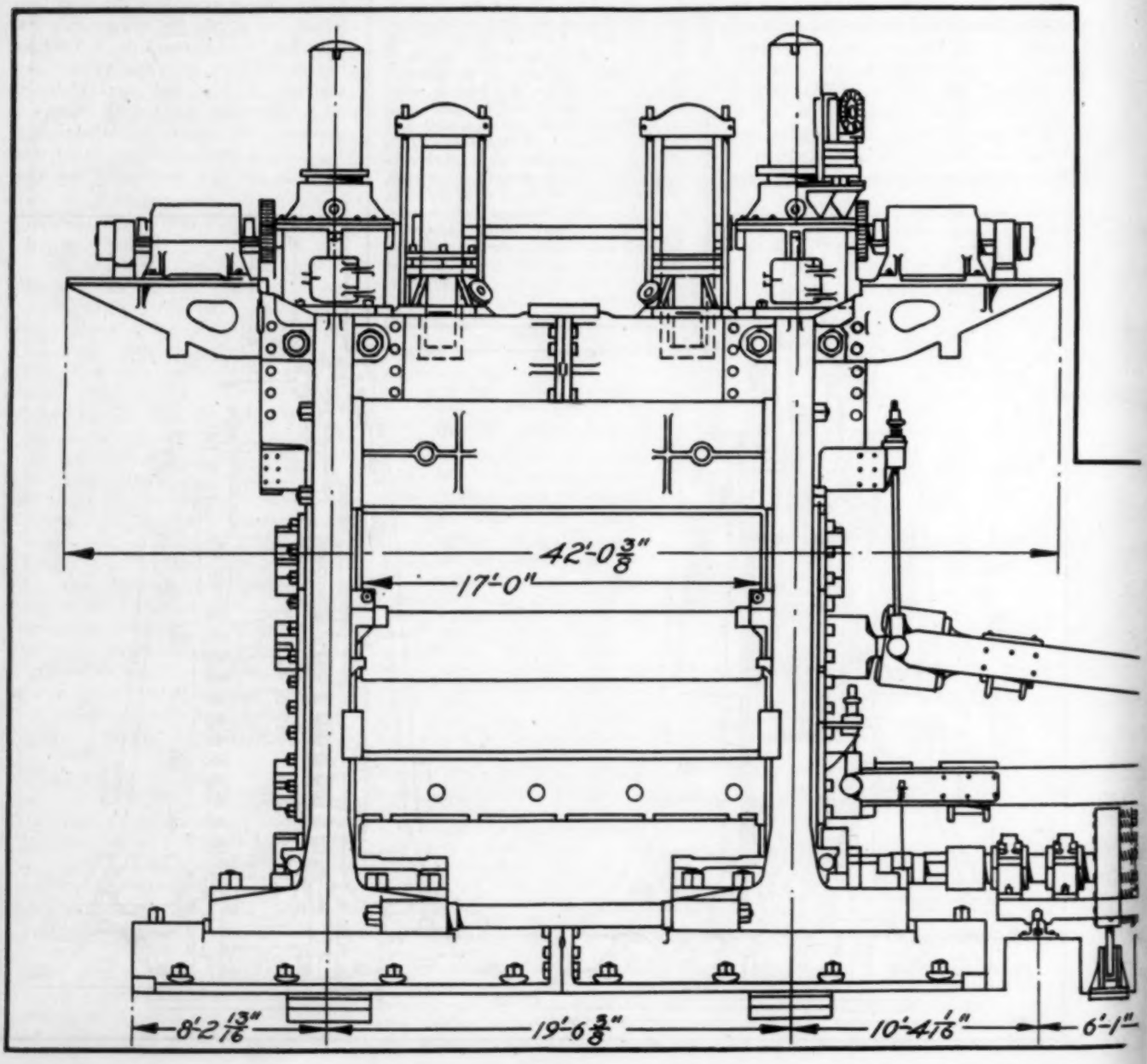
Side views of mill showing arrangement of finishing rolls and large backing rolls—The screw-down mechanism is shown in the drawing at the left.

teenth century, when the first boiler plate in the United States was rolled in the Brandywine rolling mills under the direction of Dr. Charles Lukens, grandfather of A. F. Huston and Charles L. Huston, president and vice president, respectively, of the present company. Extra wide plates constantly have been one of the leading products of the company. The latest and most notable addition to the rolling capacity of the company for such a line of manufacture has been brought about in a large measure by the tremendous rejuvenation of modern ship building in this country, which has presented new and enlarged demands upon steelmakers calling for the greatest widths of plates obtainable under present day mill practice. With the new mill in commission, the Lukens company will be able to flange marine boiler heads 15 feet in diameter from a single plate without welding. Flanging boiler heads of this size from one piece never has been done before in this country.

Could Not Make Rolls

The decision of the Lukens Iron & Steel Co. to build the largest plate mill in the United States came about in an interesting way. As frequently is the case, obstacles encountered in one direction were responsible for the way in which the matter finally was determined. Because of the growing demands from ship and car builders, railroads and other large plate users for constantly greater widths, the Lukens company took under consideration the building of an 180-inch 3-high mill after the accepted American standard.

This mill as first planned also would have been larger than any to be found today either in the United States or in Europe. When it came to obtaining the chilled rolls of the size and weight desired, however, there was no manufacturer to be found in this country who could be persuaded to undertake the contract. The 50-inch diameter rolls required for a mill of the 3-high type that had been settled upon, were far greater than anything the rollmakers ever had attempted, and there were presented difficulties of manufacture which forbade the latter bidding for this business. The result was that it was impossible to obtain rolls of the size and weight desired in the United



States. It was then that one of the Lukens company engineers suggested the adoption of the 2-high design so modified as to permit the use of smaller finishing rolls, and thereby to avoid the difficulties of roll manufacture that had been encountered. After mature investigation, this type of mill was fixed upon. The designing of the mill has been carried out by the United Engineering & Foundry Co., Pittsburgh, and in this the technical staff of the Lukens plant has collaborated. Numerous features have been embodied in the design which are the result of the experience of the Lukens company in wide plate practice.

The new mill is being built on the principle of the 2-high reversing plate stand commonly used in the British Isles, with the modification that the two finishing rolls are to be backed by two large supporting rolls. The purpose of these latter rolls will be to stiffen the mill, and to give it the added strength necessary to prevent springing of the operating rolls when rolling wide, thin plates, thus insuring uniform thickness in the finished product. This arrangement also will enable the use of operating rolls of smaller diameter, and will thereby overcome the difficulties of obtaining chilled rolls of the size which would be required in a 3-high mill of this extreme width. There will be two 34-inch diameter by 204-inch working face operating rolls of chilled iron with 27-inch necks weighing about 30 tons each, and two 50-inch diameter backing rolls of cast steel with 36-inch necks, weighing about 60 tons each.

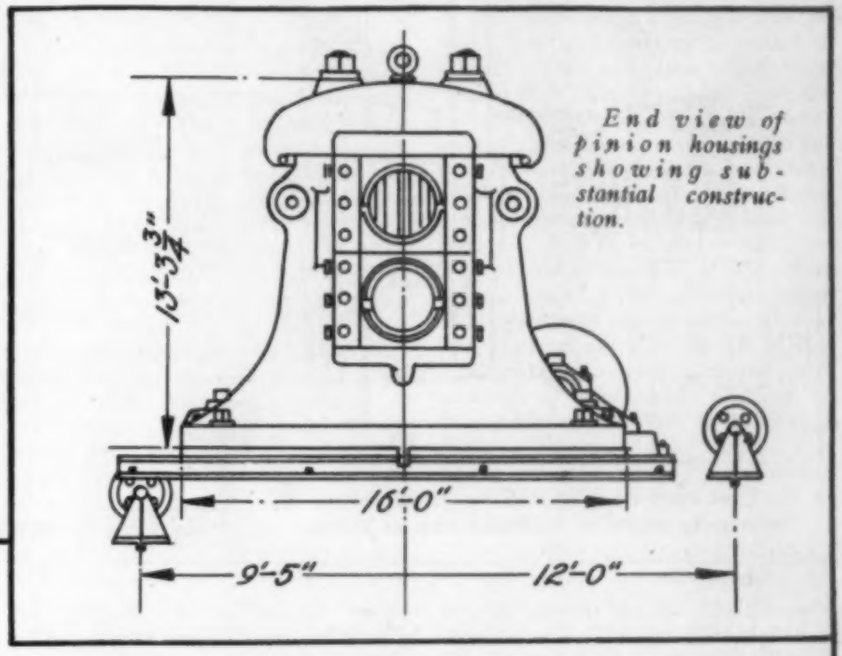
The housings of the mill are to be of steel and will be built up in four parts, consisting of two side pieces, a top bridge piece containing the screw box, and a bottom bridge piece in which is to be located the seat for the bottom rolls.

Design of Housings

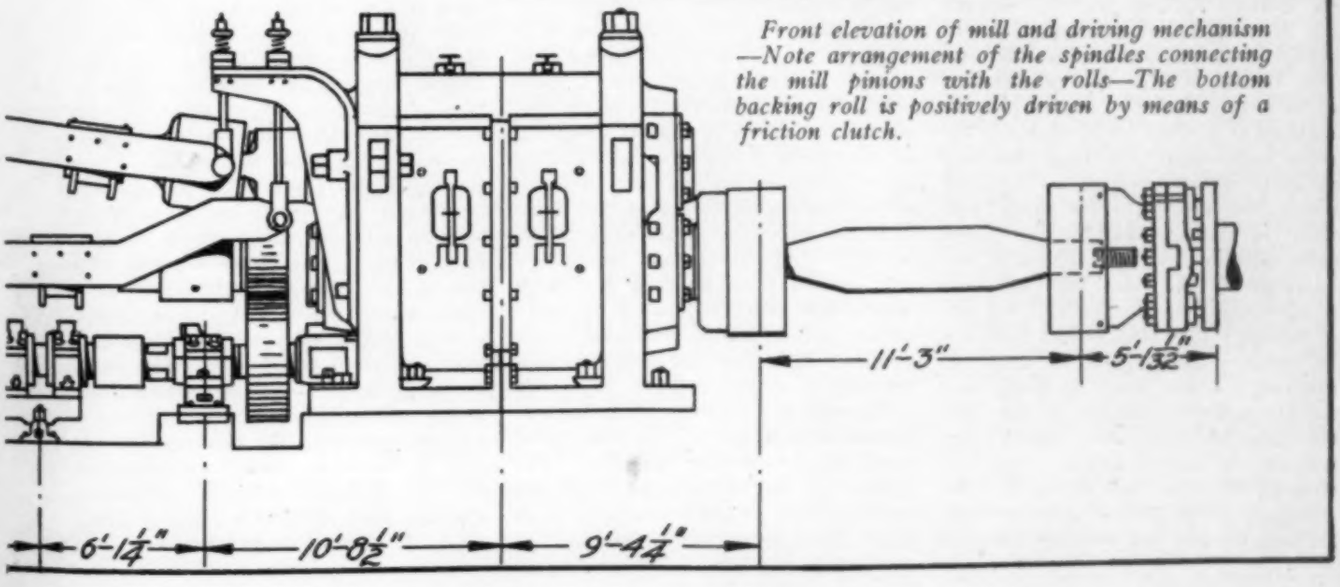
This novel method of construction is necessitated by the unusual size of the housings which preclude their being cast in one piece, since their machining and transportation in such form would be impossible. The mill, when completed, will stand about 40 feet from the top of the screw cover to the bottom of the shoes, and its overall dimensions will be slightly over 42 feet. The housing shoes will be spread 16 feet 9 inches between centers, and will be of special design, with extra large bearing surfaces.

The foundation of the mill will be of concrete on solid rock. It will be of strong, simple design, which is made possible by the cylinder arrangement. The two top roll supporting cylinders will be carried on the top spreader between the housings, and will be so arranged that they can be used as operating cylinders for changing rolls. The screw-down rig is of the well known worm and worm wheel design, and will be driven by two 150-horsepower motors, one on each housing. These motors will act as a roll release in case of a stall.

The mill pinions are of cast steel, and will have double helical cut teeth, 42-inch pitch diameter by 60-inch face. These pinions will be connected to the



End view of pinion housings showing substantial construction.



Front elevation of mill and driving mechanism —Note arrangement of the spindles connecting the mill pinions with the rolls—The bottom backing roll is positively driven by means of a friction clutch.

working rolls by spindles 20 feet long. The bottom spindle will be of the usual design, while the top or vibrating spindle will have special universal couplings. To insure the driving of the bottom backing-up roll, it was deemed necessary that this should have some positive connection between the pinions and the mill, as it was feared there would not be sufficient friction between the bottom working roll and the backing-up roll to drive the latter at all times. This positive connection will be accomplished by means of a friction clutch, which will give a positive drive to the bottom roll, and will allow slippage between the two bottom rolls, preventing breakage. The friction will be driven by gear on an extension to the neck of the bottom pinion driving into a third spindle, which connects with the bottom backing up roll through the friction clutch, located midway between the pinion and roll housings. This friction will be in duplicate, and so arranged that one device can be replaced in a short time, should it become necessary. The large backing-up rolls will be turned in the mill, places for turning rests being provided in the housing design. These rests will be left in position in the housings all the time, and will only require adjusting to the roll for use in turning. The 34-inch chill rolls will be removed and ground in a special grinding machine which is being built for the Lukens company by the Norton Co., of Worcester, Mass. This will be the largest grinder ever constructed for this class of work. The changing of the 34-inch diameter rolls has been worked out very carefully and incorporated in the mill design. In this operation the rolls are lifted by the top roll balancing cylinders and placed on a specially constructed buggy, which will run in on the middle roll rest bars. This arrangement will allow the roll to be pulled out of the housing window, where it will be picked up by the overhead crane. The 50-inch diameter backing-up rolls can be removed in the same manner if at any time this should be found necessary.

The botton pinion will be connected to the engine jack shaft by a leading spindle of the universal type. This connection is aimed to insure a minimum of back lash. This leading spindle will be so arranged that it can be quickly removed and a slow motion turning rig slid in place to be used in dressing the 50-inch backing-up rolls.

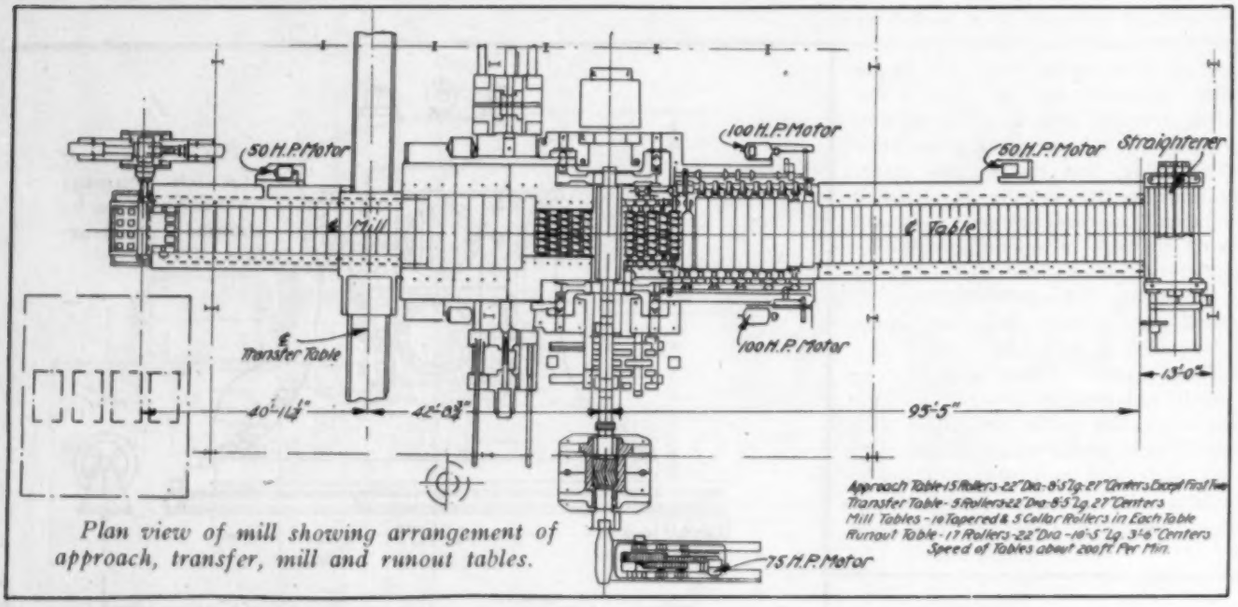
The mill is to be driven by a 46 x 70 x 60 twin tandem compound condensing engine, fitted with a jack shaft and a gear ratio of one to two, which will render it capable of giving an enormous torque for rolling wide plates. The engine has been designed and is being constructed by the Mesta Machine Co., of Pittsburgh. The steam for operating this engine will be obtained from Babcock & Wilcox waste heat boilers located on open hearth and reheating furnaces; these boilers will be operated at 160 pounds pressure and 100 degrees superheat.

The mill will be fully equipped with tables so arranged to do away with hand labor wherever possible. The ingots are to be received from the furnaces by a hydraulically-operated ingot tilter, from which they will go to the approach table, and from there to the mill tables. The approach table will be about 40 feet long, and the mill tables of about equal length. Each mill table will consist of 10 cylindrical rollers and five disk rollers. These rollers will be driven by cut gearing, and the bearings and gearing all will be flood lubricated by an oil pumping system which is to be installed in duplicate. These tables will be equipped with mechanical appliances for handling large plates, so that it will not be necessary for them to be touched by hand power, as is done in the present-day mill practice.

The plates, after being rolled, will pass over the runout table, 65 feet long, to the straightening rolls. These straightening rolls are being furnished by Hilles & Jones Co., Wilmington, Del., and are motor-driven. After leaving the straightening rolls, the plates will pass to the cooling tables. These will be chain tables, arranged so that they can be operated in triplicate. Either one, two or three tables will be used, depending on the length of the plate transferred. If the plate is over 35 feet long, two tables will be needed; if over 70 feet, three will be used. An inspection tilt-up device for turning up the plates so that the bottom side may be inspected is located in this chain table. It is operated by hydraulic cylinders. This rigging will be of the necessary size and strength to accommodate plates 192 inches wide.

After inspection, the plates will proceed to the shear runout table through the cut-off shear, which is hydraulically operated and has a 210-inch gap.

(*Continued on page* 1055)



Plan view of mill showing arrangement of approach, transfer, mill and runout tables.

Conservation of Iron Ore Resources

The Author of the Following Paper is Emphatic in His Statement that the Ore Resources Are Greatly in Excess of the Present Requirements and Urges that Sane Economic Practices be Adopted

BY C. K. LEITH

IN a paper on the iron ores of America, presented at the Pan-American Scientific Congress at Washington, I have emphasized the fact that the reserves of iron ores in the two Americas are enormously in excess of the requirements of the present generation, in fact, so large that no shortage is to be anticipated for many generations in the future; that a large part of the value of iron ores is put into them by man's efforts to make them available. This fact is fundamental for the intelligent consideration of policies of conservation as applied to iron ore. As I interpret it, this fact makes it practically unnecessary that the present generation should make any especially sacrifice for future generations in the way of conservation of its iron ore resources. Even if we were disposed to look forward to a period of 100 or 200 years, with a view to insuring the welfare of the people living at that time, it is doubtful whether any procedure we could now formulate would materially help them in the matter of iron ores, so large are the reserves available. In order that an appeal for conservation may be effective it must obviously favor the welfare of the present or immediately following generations; it must promise benefits to general and individual welfare during a period within the range of comprehension of the average man.

Within this more restricted field there is ample opportunity for conservation measures which can be made of practical benefit to the present generation and indirectly help the future. Such measures include a variety of mining and business methods which will tend toward the minimizing of waste of ores and bring the maximum possible return on the investment; in fact, all measures which are taken by any far seeing business man or corporation looking forward to the maximum return, not for the present year, but for a series of years. The business man measures the relation between the present and the future profit by the interest rate. With this as a basis, he takes such steps as will insure the maximum return to himself or immediate posterity. To make such expenditures as will amount, with compound interest, to an aggregate beyond the probable return in the future, means a sacrifice of the present to the future which does not appeal to him as a business transaction and for which there is no strong demand based on possible shortage for the future.

If, for instance, in mining Mesabi iron ore it is found possible to stock certain of the lower grades at such a figure that when compounded at a normal interest rate the money will be returned at some future time, the operator is using a conservation method which is a benefit to himself and immediate posterity. To spend for this purpose an amount so large that the receipts for this stockpiled ore will never catch up with the compound interest on its preliminary investment means sacrifice to the future, which the large reserves of ore do not seem to require. If the miner spends $2 worth of energy and materials to save $1 worth of materials for posterity, he is making a sacrifice too great to be required of an individual. Up to certain limits, it is often cheaper to waste than to save, that is, cheaper when the human factors in the equation are considered as well as the amount of material saved. In such cases wasting may be real conservation when public welfare as a whole is considered. The problem comes down to a question of how much one can afford to spend in order to accomplish a result which will eventuate during a period of years in the future with due regard for the interest rate, which measures the difference between the present and the future.

Such kinds of conservation as above indicated are aimed at in the normal course of enlightened business. The good operator of mines is distinguished from the poor operator to some extent by his ability to think far enough ahead. In planning for the future he often is aided by the demands of the fee owner who is interested in getting the maximum possible returns from the property through the life of the mine. In fact there often develops here a conflict of interest which may even lead to measures of conservation detrimental to the best interests of the operator. With the concentration of control in large corporations has come a natural tendency to think in larger terms and to apply conservation methods which will bring the maximum results through a period of years representing the probable life of the corporation. In this the interest rate is figured as a matter of course. The well established large company is not so much at the mercy of immediate requirements as competing smaller interests, but has the means to conduct its operations on the basis of average returns through a long series of years. It does not find it necessary to make a considerable sacrifice of the future for the profit of the immediate years. In this respect, concentration of control has undoubtedly exerted a conserving influence as compared with unrestricted competition working on the principle of let well enough alone. On the other hand, over capitalization requiring immediate large returns may be inimical to conservation of resources.

The natural tendency of business to seek a standard of operation determined more or less by the best results of the most far sighted people will, as a matter of course, involve improvement in conservation methods which will benefit the present generation. The present interest in questions of efficiency and efficiency systems is a step in the direction of conservation, which is leading to an analysis of the factors in the problem and the determination of how far one can wisely go in sacrificing the present for the future in order to get the maximum possible returns. The development of economic theory is leading to a clearer recognition of the factors involved and therefore to plans of operation involving less waste, when the operation as a whole is considered, through a period of years.

Notwithstanding these tendencies, the average of operation of iron mines is far from reaching the standard of efficiency set by some of the

A paper presented before the American Institute of Mining Engineers, New York, February, 1916. Copyrighted by the American Institute of Mining Engineers and especially released for publication in *The Iron Trade Review*.

more far sighted and larger companies. There are far too many operations in which the results of the present or next year figure so largely in plans at the expense of future profits. It may be said that such operators are the only losers, but it probably does not require an extended argument to indicate that the general welfare is promoted by the welfare of the maximum number of individuals. There is, therefore, abundant opportunity for the application of educational methods designed to raise the general standard. Innumerable technical societies are disseminating information tending to improve the standard. Government organizations, like the bureau of mines, geological survey, and various state organizations, tend toward this raising of standard, by making available to all the best results and methods of the few.

The problem of conservation is so complex that, as the writer sees it, it is practically impossible to lay down rules of conservation applicable to iron ore as a whole, to say nothing of all mineral products. There is too great a variety of local conditions. What might be intelligent conservation in one case would amount to confiscation or needless sacrifice in another. It might be possible, for instance, in a given district where it is shown that a certain grade of ore could be conserved for the future for a certain expenditure, to formulate rules covering this. However, to carry this rule over to another region might require unwarranted sacrifice on the part of the individual in favor of future generations.

The conservation propaganda which has been so vigorously waged in recent years in the United States has, as a rule, not been qualified by the above restrictions. The emphasis has been entirely on the welfare of posterity, implying sacrifice to the present generation, without raising the question whether this sacrifice is in all cases warranted, and without attempt to balance the welfare of the present and the future. There seems to have been little recognition of the principle that measures tending toward the welfare of the present generation are conservational in their effect; are the natural first steps in any conservation plan; are the ones which can be most intelligently formulated; will indirectly benefit future generations, and will logically lead to the development of further measures for the protection of future generations when it becomes clear what balance between present and future welfare should be striven for. The result has been that many mining men, sympathetic with the general idea of conservation, have been repelled by its impracticability when applied to their specific problems. Others carried away with the enthusiasm of the idea have attempted to introduce measures which have become so burdensome and such a handicap in competition that they have been speedily abandoned. A number of cases might be cited of specific and distinct benefits of the conservation movement in initiating specific measures for conservation of ores. The most important result of the movement to date seems to have been to stir people to consider conservation questions and to develop a favorable atmosphere for the introduction of specific measures which on examination may be found to be practicable. It seems to the writer that definite recognition of the fact that conservation involves consideration of the welfare of the present as well as that of the future should be a powerful stimulus to development of effective conservation measures. The changes will be largely accomplished through an individual initiative in attempting to reach the highest business standard. Governmental and educational agencies can supplement effectively these tendencies by spreading the information and in making certain standards compulsory for specific groups of conditions.

STACK OF TOTE BOXES

For the government or other public bodies to go further, and to formulate rules for conservation which require sacrifice of the individual to distant generations, would necessitate a considerable exercise of public power backed by strong public sentiment, which does not seem to be needed in the case of the iron ores, because of the enormous quantities available, which make it reasonably certain that posterity will be taken care of. The probability is that in the future, as in the past, the individual sacrifice will be limited to sacrifice of the immediate moment for a gain which can be definitely approximated in the near future. If, however, it becomes desirable to bring public power to bear on the development of the iron ores, with a view to conserving these ores for posterity at a considerable additional expense on the part of present owners, the burden of such sacrifice should be taken by the government and not by the individuals.

Stacking Tote Box

The New Britain Machine Co., New Britain, Conn., has recently brought out a stacking tote box which is said to embody a number of improved features. This box is made from 16-gage steel and welded throughout. The handles are made of 14-gage stock, folded double and punched to afford a hook hold for dragging the box along the floor. It is believed that the size adopted, 20 x 12 x 6 inches, will meet the average requirements. The sides slope inward just enough to provide support for the box above. The deviation of the sides from square, however, is so small that rectangular work can be packed as conveniently as regular work. A ¼-inch selvage around the edge of the box is said to increase its stiffness. Two half runners, slightly shorter than the box, are spot welded to the bottom. These runners are beveled on the ends and are so placed that when the box is in stacking position they are in contact with the edges of the box below, thus relieving any tendency of the sides to spring in under heavy weights.

The upper corners of the ends are cut off at an angle of 45 degrees. Embossed pieces are spot welded to the lower corners of the ends parallel with the upper corners and in such a position as to act as guides in bringing the box into stacking position. These guides, in conjunction with the runners, also serve to prevent any sidewise shifting of the boxes while being trucked. The runners present only line friction when the boxes are dragged over the floor, and, due to this construction, all wear and tear is removed from the bottom. As a result of this feature it is believed that this box lends itself to storage in racks better than the average, because it will slip into and out of the rack with greater ease. Owing to the small bearing surface and the firmness of the stacking feature it has been found that a stack of five or six loaded boxes can be moved easily.

Modern Ideas in Heat Treatment

Heat Treatment is an Exacting Process—The Following Article Tells How One Company Made Plant Improvements Which Have Increased the Quality of Its Product and Effected Economies

THE heat treatment of metals is unquestionably one of the most interesting operations carried on in the industrial world today and success in this field calls for the most careful and conscientious attention to obtain the desired results. Metallurgists may determine with a nicety just what treatment to prescribe to produce certain qualities in steel of a given analysis, but unless utmost care is exercised in the heat-treating room, the results of the process will be unsatisfactory. Compared with some of the steps in the manufacture of iron and steel, heat treating may be said to be almost in its infancy, yet in spite of this, it already has yielded remarkable results in adapting metals to specific purposes. Mechanical engineers are constantly becoming more exacting in their requirements. Machines are required to run at increasingly higher speeds; their parts are called upon to withstand great stresses and to wear well, yet they must be light in weight. Improved design has been largely responsible in the attainment of this purpose, but the proper and scientific heat treatment of metals without doubt has made possible much of the wonderfully fast and efficient machinery which characterizes modern industry.

Some Essential Factors

As with almost all scientific processes which call for skillful operation, the presence of certain fundamental factors and conditions in carrying on the process of heat treating tends to give more uniform results and to reduce to a minimum the possibility of producing work below the required standard. One of the most pertinent factors in the successful operation of a heat-treating furnace is the regulation and maintenance of the temperature of the furnace within a reasonable degree of accuracy. The ideal furnace is one which maintains a uniformly distributed heat about the pieces to be treated when the furnace is packed to capacity. Furthermore, in gas-fired furnaces, it is desirable to have a uniform mixture of gas and air supplied at a constant pressure as this tends to decrease variations in the temperature of the oven after the desired temperature of the furnace has been reached.

In order to eliminate as much as possible the variation in the quality and flow of gas to its furnaces, the Steel Products Co., Cleveland, has recently made improvements in its heat-treating room which involve the use of the gas mixing and pumping apparatus made by the Selas Co., New York. The products of the Steel Products Co. consist largely of automobile motor valves, poppet valves, spring shackle and steering knuckle bolts and valve tappets made of both common and alloy steel, demanding the best of heat treatment. This material is handled in a number of Frankfort furnaces, which are shown in Fig. 1. Several forging furnaces are also employed in conjunction with various upsetting and forging machines.

The principle of the system now

FIG. 1—BATTERY OF FURNACES SHOWING SINGLE PIPE WHICH BRINGS THE MIXTURE TO THE SPECIAL BUNSEN BURNERS

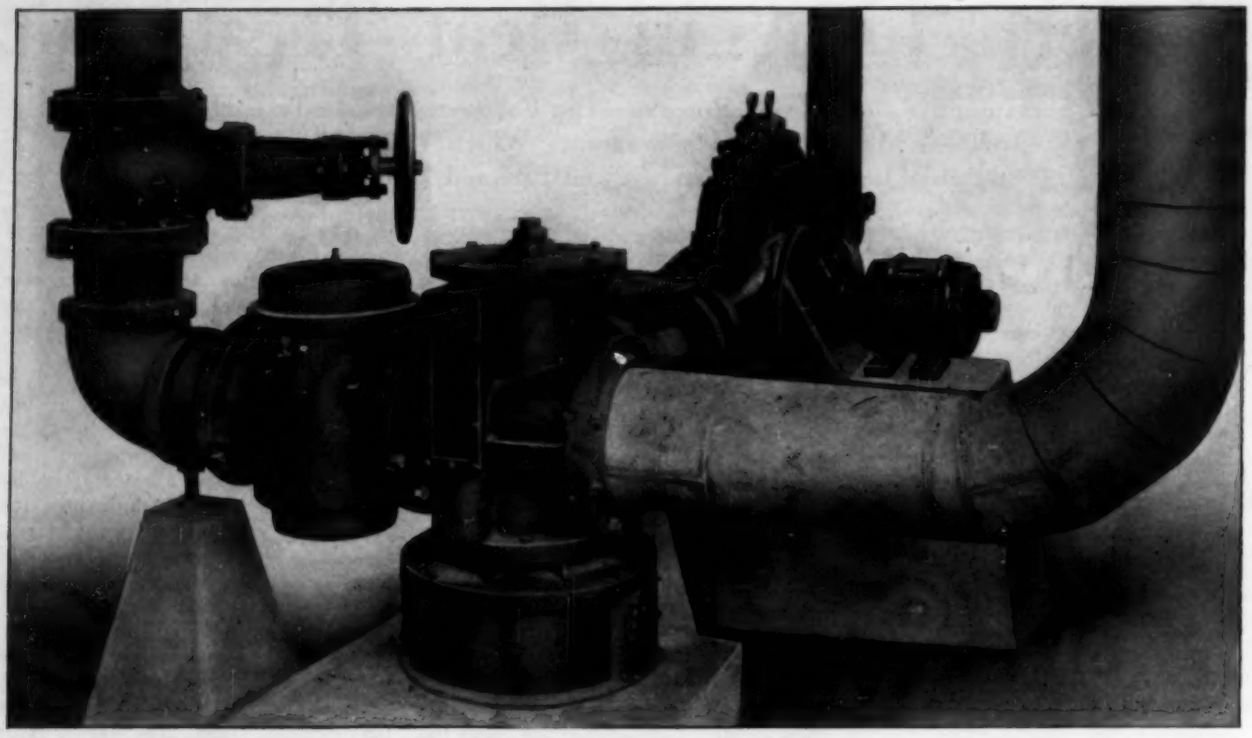


FIG. 2—GAS MIXING AND PUMPING APPARATUS. THE GAS INTAKE IS SHOWN AT THE LEFT AND THE AIR INTAKE AT THE RIGHT. THE PUMP AND SERVICE PIPE MAY BE SEEN IN THE BACKGROUND

in use at this plant involves the thorough mixing of scientifically pre-determined proportions of gas and air. The mixture is distributed to the furnaces under a constant pressure which is maintained by a constant-speed centrifugal fan located between the mixer and the furnaces. The gas-mixing apparatus and the centrifugal pump are shown in Fig. 2. The operation of this machine, which was developed by German engineers, is based primarily upon the idea of mixing gas and air at the same pressure. This feature of equalizing the pressure of the gas and air, according to the maker, is essential if the proportions of each are to be accurately controled. This is accomplished by a counter-balanced gas governor into which the gas is received as it flows into the mixer from the gas meter. This governor is shown to the right in Fig. 3. The air, usually drawn from the exterior of the building, enters through the vertical pipe and is mixed at atmospheric pressure with the gas entering through the gas governor. After leaving the mixer, the mixture is forced through the pipes to the different furnaces by a 15-horsepower constant-speed centrifugal pump which maintains a constant pressure regardless of the amount of the mixture being consumed. A check valve is inserted between the mixer and the pump, to eliminate danger of back fires.

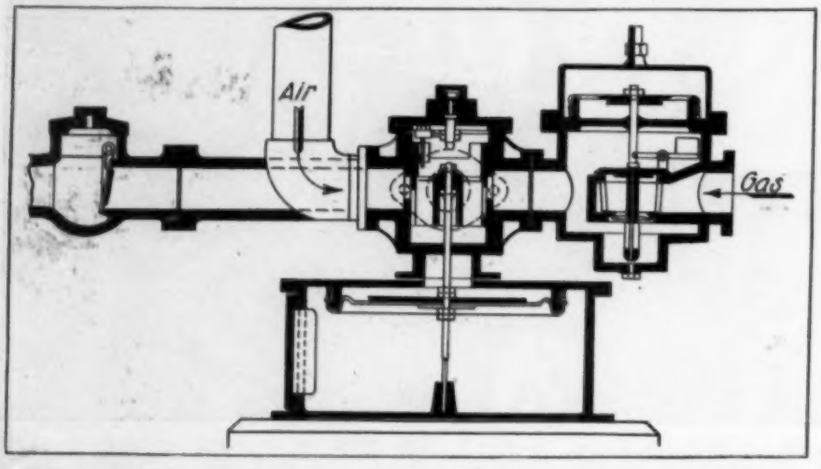


FIG. 3—DETAIL OF EQUALIZING MECHANISM AND MIXTURE REGULATOR

In this system no storage of gas takes place, the amount of gas passing through being entirely determined by the necessities of the furnaces. The suction pump regulates the amount of gas to be used by acting on the diaphragm located just below the mixer. This mixer consists of a piston moving vertically in a sleeve, the piston being mounted on a guide spindle fastened to the diaphragm. As the furnaces are turned on or off, the suction of the pump causes this diaphragm to rise or fall, and by means of the guide spindle raises or lowers the piston, thus admitting more or less gas and air. The piston, in addition to the outlet to the centrifugal pump, is provided with two oblong ports, one for admission of air and one for gas. They conform with similar ports in the sleeve. By rotating the piston the relative position of these ports may be adjusted so as to secure the desired mixture by means of the ratio of gas and air admitted to the mixer. After being adjusted, the concentric movement of these cylinders is fixed by a lock nut, hence no variation in the percentage of gas and air can occur except intentionally.

As a mixture of gas and air in the proportions to produce perfect combustion is explosive, only part of

the air necessary to insure this perfect combustion is taken in through the machine. The remainder is added at the burner itself by means of a bunsen attachment, thus causing a non-explosive instead of an explosive mixture to flow through the piping leading from the mixer to the various furnaces.

The proper mixture for each installation is determined with the aid of a test bunsen burner. These test burners are supplied by the Selas Co., and indicate the proper mixture required to give the desired temperature in the furnace when the gas is supplied at a given pressure. These test bunsens were designed during laboratory experiments, and operate on the principle that the height of the combustion cone is related to the pressure and proportions in which air and gas are mixed. In regulating the proportions of gas and air in the mixer, the cone of the test burner is brought to a predetermined height. One of the chief advantages of this system lies in the fact that only enough air is supplied to the burners to insure proper combustion, thereby introducing an economy of gas which effects a material saving.

Centralized Control

Another interesting feature of the heat-treating equipment used at the Steel Products plant is the system of centralized control of furnaces which has been evolved by W. D. Bartlett, vice president, and W. H. Spire, chief engineer. The gas from the pump is piped to the operator's house, which is shown in Fig. 5. Valves located in this house lead to the furnaces. Because of the fact that the gas is supplied to the furnaces through a single pipe for each furnace, and because the mixture of gas and air is adjusted before it passes through the regulating valves, it is possible for the pyrometer man to regulate the temperature of each furnace separately from his control board. A test burner and pressure gage located in the operator's house not only serve to indicate if the pressure and quality of the gas are being maintained as desired, but also serve to indicate the cause of trouble in case of accident to the mixer or pump. Furnace temperatures are indicated in the control house by a Leeds-Northrup potentiometer-type pyrometer. Leads from the couples which are protected from the high temperature by nichrome tubes, are brought to the control house where they terminate in a selector switch by means of which the temperature of any furnace in the group

(*Continued on page* 1057)

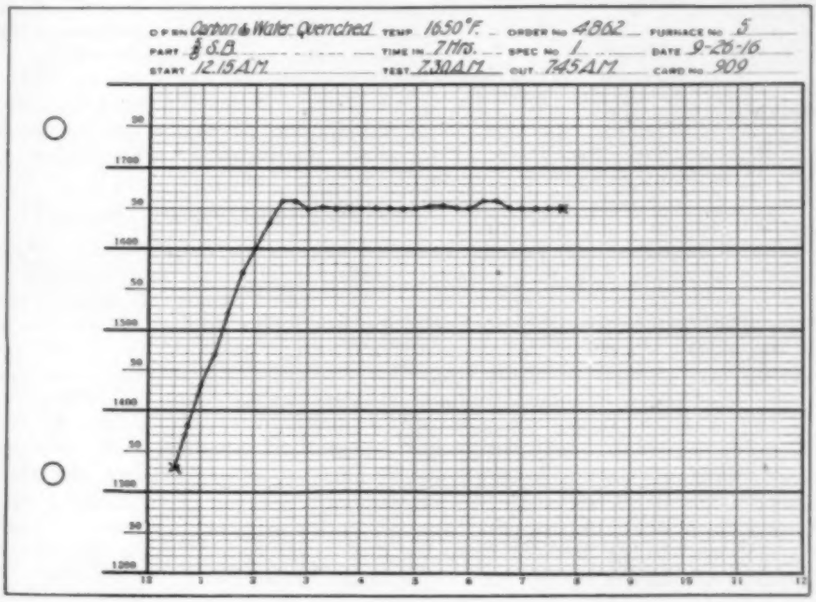


FIG. 4—LOG CHART OF A TYPICAL FURNACE RUN. FIG. 5—PYROMETER MAN'S CONTROL HOUSE—Annunciator for signaling heating-room foreman may be seen of the roof. This is operated by the pyrometer man by turning a similar dial within the house.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Recovering Waste Tin

Kindly tell us how to recover tin from tin-plate waste.

There are three general methods of separating the tin from the steel sheets, the electrolytic, the chemical, and the mechanical. The simplest but the poorest way is the mechanical, which consists of melting or driving off the tin. In the chemical method the tin is dissolved off by means of acids and then recovered from the solutions by further treatment. The electrolytic method makes use of a direct current of electricity with the scrap tin immersed in an electrolyte that is either an acid or an alkali. The tin is usually produced in a spongiform condition. All of these processes require special equipment and expert attention. Numerous patents have been applied for covering methods of recovering tin.

Thermostatic Metals

Are thermostatic metals made in the United States, and if so, in what grades or thicknesses are they produced?

Metals for all thermostatic purposes, and in any thickness from 0.015-inch to 0.25-inch are regularly produced in the United States. In ordering specify the thickness required, and state the purpose for which the metal is to be used.

Elastic Limit and Tensile Strength

Please explain the difference between elastic limit and tensile strength.

These terms are used most commonly in the testing of materials for their physical properties. Tensile strength is the resistance of the material to being pulled apart by strain applied longitudinally. It is important that tensile strength in structural members be known so as to determine their power to bear loads. The elastic limit of a material is the point to which it will bear a stress and return to its original state without set or distortion. Stress applied in excess of the elastic limit causes a deformation which is permanent. Further terms used in this connection are the period of elasticity, indicating the period before the elastic limit is reached; the yield point, the point at which the elastic limit is exceeded; and the elastic ratio, the ratio between elastic limit and ultimate strength, found by dividing the former by the latter.

Maximum Carbon in Iron

What is the highest amount of carbon that will be absorbed by pure iron?

A series of experiments conducted by E. Adamson, Sheffield, England, made public in a paper on "Carbon in Cast Iron", contributed to the proceedings of the Ipswich Engineering Society, indicates that at 2,200 degrees Cent. iron will absorb 9½ per cent carbon. This appears to be the maximum point, as above 2,200 degrees Cent. the iron would not retain over 9½ per cent carbon, the excess being burned out. At 1,100 degrees Cent. the maximum absorption was 4¼ per cent.

Annealing Malleable Iron

What change takes place in the structure of malleable iron when it is annealed? Is it possible to over anneal malleable castings?

Briefly, malleable iron castings are annealed by raising them to a temperature at which the cementite and pearlite break down into iron and carbon (800 to 900 degrees Cent.) It is essential that the heat permeate the entire structure of the casting. Malleable castings can not be over annealed but may be burned if heated to extreme temperatures. No harm results, however, if the casting is permitted to remain in the furnace more than the requisite time for thorough heating, provided the temperatures are correct.

Temper Colors and Approximate Temperatures

For the purpose of tempering carbon steel by noting the colors, will you kindly state the temperatures corresponding to the temper colors from yellow to blue?

The temper colors ranging from the hardest to the softest steel when hardened steel is slowly heated, are very pale yellow, 430 degrees Fahr.; pale yellow, 450 degrees; straw color, 470 degrees; brown, 490 degrees; purplish brown, 510 degrees; purple, 530 degrees; dark blue, 550 degrees; full blue, 560 degrees; light blue, 600 degrees; gray, 725 degrees. All these colors may be seen on the same piece of steel, such as a saw blade, for example. The hardness corresponding to any color may be held by immediately quenching the steel when the color appears.

High Speed Steel

We find that we have some tool steel which has been on hand for several years, marked "Cammell Laird High Speed Steel". Can you advise us by whom this steel is manufactured?

The tool steel is evidently manufactured by Cammell, Laird & Co., Ltd., whose offices are located at 9 Victoria street, Westminster, S. W., London.

Production of Copper

What accounts for the decline in the production of copper in California?

The federal geological survey states that the decline in copper production in California is due to a considerable extent to the necessity of eliminating smelter "smoke" ingredients injurious to vegetation. This has resulted in closing all but one of the smelters in the Shasta county district. California originally was one of the largest copper producing states of the west. At one time it was second only to Michigan in copper production.

Recrystallization After Deformation

The Following Article is a Discussion of a Paper by Matthewson and Phillips.—The Authors Present Some Interesting Data on the Phenomenon of Recrystallization

BY HENRY M. HOWE

THIS paper is a discussion of the extremely valuable contribution by Mathewson and Phillips, entitled "The Recrystallization of Cold-Worked Alpha Brass on Annealing," which appeared in the January, 1916, *Bulletin* of the American Institute of Mining Engineers. This paper by Matthewson and Phillips not only gives us a wealth of important data reached with great intelligence, but also shows both uncommon powers of imagination and a perfectly fair spirit. Let me try to analyze some of their results, and to enunciate some of the laws to which these results point. For brevity I refer to them as the authors. Plastic deformation in a single direction, as in cold-rolling, draws the grains out in that direction, that is, inequiaxes them, without destroying their apparent individuality. Each grain seems to endure the drawing out without changing either its volume or its orientation materially, for the etching tint of each grain seems to be as uniform after as before the drawing out, save for the "etch bands." As the drawn-out metal is heated progressively, on reaching a certain "disintegration temperature" these old grains seem to break up, probably into submiscroscopic fragments, and this apparent disintegration is followed by a coalescence of these fragments, so that their number decreases and their size increases, till they may become very much coarser than before the drawing out. Ruder coarsened the grains of silicon steel in this way till single grains reached an area of 50 centimeters or about 7.75 square inches.

The deformation itself probably breaks each grain up into many very small fragments, but the fact that each grain continues to have a uniform etching tint different from that of its neighbors indicates that these fragments retain the initial common orientation of the grain. The apparent disintegration which we observe, then, is rather an abandonment of community of orientation for individuality of orientation, by the fragments formed earlier during the deformation. Hence we should speak rather of a "reorientation" than of a "disintegration" temperature. The reorientation and regrowth may jointly be called "recrystallization." The recrystallization is accompanied by softening, that is to say, though the first raising of the temperature after the cold-rolling may increase the hardening which the cold-rolling caused with further rise of temperature, the hardness falls progressively to that of the normal metal. While the authors would explain the nature of disintegration and regrowth, their main objective seems to be to trace the connection between these two processes and this softening.

Our natural conception of disintegration and grain growth I take to be that the plastic deformation itself breaks each grain up into many fragments as already pointed out, of which the number increases and the size decreases as the deformation increases; that each fragment retains for the time the initial orientation of the grain from which it is broken, as is shown by the uniform etching tint of all these fragments of a given grain; but that each is sheathed completely with metal made amorphous by the friction during the act of deformation. This amorphous metal cements the whole together. On this hypothesis when the deformed metal is heated, five distinct changes occur side by side, though not necessarily simultaneously or in any fixed proportion to each other. These are, first, a progressive reabsorption of the amorphous sheaths by the crystalline fragments which they inclose; second, a suspected progressive but undescribed change in the condition of so much of these sheaths as has not yet become reabsorbed, or of the crystalline grain fragments thus sheathed, or of both; third, an apparent disintegration of the initial grains, which is really only a reorientation of the grain fragments already formed; fourth, their progressive growth by coalescence, with consequent lessening of their number; and fifth, the progressive release of stress as the mobility increases and the existing elastic limit falls correspondingly. The first three may be grouped together as "recrystallization." Let us glance at the evidence that these five agencies are at work.

The reabsorption of the sheaths with rising temperature is inferred from the observation that, by heating before

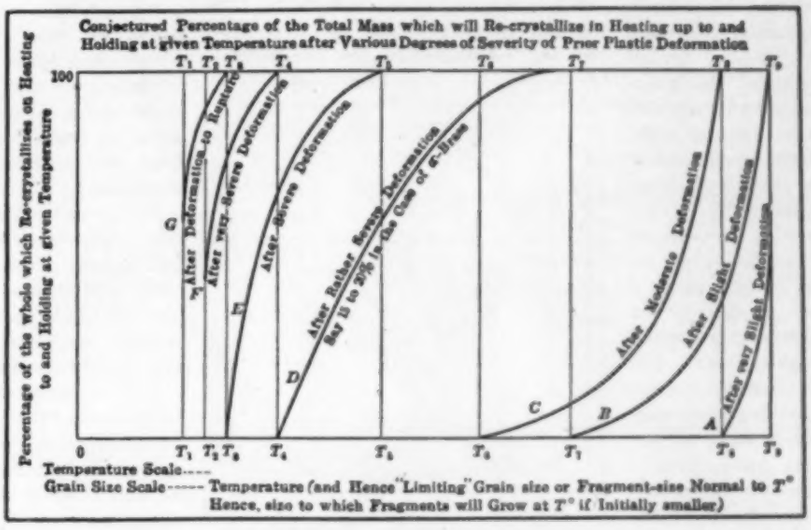

Conjectured Percentage of the Total Mass which will Re-crystallize in Heating up to and Holding at given Temperature after Various Degrees of Severity of Prior Plastic Deformation
Percentage of the whole which Re-crystallizes on Heating to and Holding at given Temperature
100
0
After Deformation so Superficial
After very Severe Deformation
After Severe Deformation
After Rather Severe Deformation
Say 15 to 20% in the Case of α-Brass
After Moderate Deformation
After Slight Deformation
After very Slight Deformation
G
F
D
C
B
A
Temperature Scale-----
Grain Size Scale----- Temperature (and Hence "Limiting" Grain size or Fragment-size Normal to T° Hence, also to which Fragments will Grow at T° if Initially smaller)

FIG. 1—CONJECTURED PROGRESS OF RECRYSTALLIZATION OF COLD-WORKED BRASS ON PROGRESSIVE HEATING. CONJECTURED PERCENTAGE OF THE TOTAL MASS WHICH WILL RECRYSTALLIZE IN HEATING UP TO AND HOLDING AT GIVEN TEMPERATURE AFTER VARIOUS DEGREES OF SEVERITY OF PRIOR PLASTIC DEFORMATION

A paper to be presented at the New York meeting of the American Institute of Mining Engineers, February, 1917. The author is Emeritus Professor of Metallurgy, Columbia University.

etching, the etch bands, which seems to represent an accumulation of this same amorphous metal along the slipping planes, are made first fainter and finally undetectable.

The reorientation of the grain fragments is shown by the apparent disintegration which the grains undergo, for this disintegration means only that the several fragments of a given grain cease to have common orientation and hence to etch alike, and instead adopt each a new orientation, so that they etch differently and hence appear as distinct grains or grain fragments. It is not clear that this distinction between grains and grain fragments need be insisted upon in what follows, for indeed each fragment seems for all intents and purposes to be an independent grain, once its reorientation has occurred.

The progressive growth of the grain fragments is familiar to all through the coarsening that occurs on heating cold-rolled or otherwise plastically deformed metal. The progressive release of stress could no doubt be proved by noting how much, after reheating to various temperatures, the specimen bends out of shape spontaneously on cutting away a fixed part of it, so as to destroy the balance of internal stresses remaining after the initial cold-rolling itself. We may assume confidently that the degree of this spontaneous bending decreases progressively as the temperature of annealing, prior to cutting away, rises.

A progressive change in the condition of the amorphous sheaths or of the crystalline fragments is neither shown nor known. I have inferred it as a probable cause of the perturbations which the cohesion, as indicated by the elastic limit and hardness of cold-rolled iron, both pure and cementite-bearing, mild steel, undergoes on gentle heating. On either slight heating or mere rest such iron may soften materially or may harden greatly, according to the intensity of the previous deformation.

In what proportion is the softening caused by annealing due to each of these five influences? Though the present evidence does not enable us to give a full answer to this question, some inferences concerning it may be drawn. Let us see what importance we are inclined to assign each of these five supposed agencies.

The relief of stress is not likely to cause a very large fraction of the softening induced by annealing; first because it is incompetent to explain the great hardening and embrittlement which gentle heating causes in cold-worked iron; and second because the progress of the softening, both absolute and relative, in the authors' results is not such as would be expected to be caused by stress-relief. Thus on the theory that stress-relief is the chief cause of the softening, it is hard to see why a progressive increase in the degree of cold-rolling should lead either to the progressive and marked lowering of the temperature of most rapid softening, or to the marked narrowing of the temperature range in which most of this softening occurs, or why, after 8 per cent reduction by rolling, the softening should be only 1.4 units between 350 degrees Cent. and 450 degrees Cent., yet should rise to 2.1 units between 450 degrees Cent. and 550 degrees Cent. and to 2.5 between 550 degrees Cent. and 650 degrees Cent.

If we are right in conceiving that visible disintegration represents the breaking away from the initial orientation and substituting a new one in each of the several grain fragments which

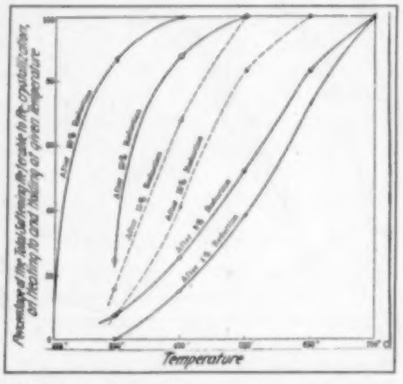


FIG. 2 — OBSERVED PROGRESS OF SOFTENING OF COLD-ROLLED BRASS

thereby become visible, then before any large fraction of the fragments have thus changed, the change should become visible, substituting in the earliest of the reorienting grains finer uniformly etching areas for the initial coarser ones. On this conception, disintegration is not likely to be the chief cause of the softening, because after the authors' 4 and 12 per cent reductions more than one-third of the total softening occurs from 100 degrees Cent., to 200 degrees Cent., before the reorientation becomes visible.

Again, it is hard to reconcile the belief that most of the softening is due to reorientation with the fact that, after their 35 per cent reduction, 80 per cent of the total softening occurs after reorientation has become visible, and successive softenings each of about 10 per cent of the total are found at 200 degrees Cent., 300 degrees Cent., and even 400 degrees Cent., higher, though the micrographs suggest no such temperature-distribution of the reorientation.

If we conceive, as seems reasonable, that the grain fragments cannot coalesce with each other to any important degree before they reorient themselves and thereby cause visible disintegration, then the great softening which, after the 4 per cent and 8 per cent reductions, precedes visible reorientation, cannot be referred to grain growth. This disinclines us to refer the softening as a whole chiefly to grain growth, in spite of the very great softening that accompanies the replacement of finer by coarser-grained gold in the important experiments of Fahrenwald, a softening so great that we hesitate to refer it solely to difference in grain size. The authors clearly share this belief.

Another indication that grain growth is not the chief cause of the softening is the discordance between the curves of grain size and of hardness. Apparently there is a great retardation of grain growth from the 350 degrees Cent., 450 degrees Cent., to the 450 degrees Cent. 550 degrees Cent. range, and it is believed that there is such a retardation from the 450 degrees Cent., 550 degrees Cent., to the 550 degrees Cent., 650 degrees Cent. range, yet in passing these ranges the softening undergoes no corresponding retardation, nor does the tensile weakening.

Thin as these sheaths seem to be, if we refer to them the great hardening that cold work is capable of giving we must infer that their total volume forms a very appreciable fraction of the whole mass, an inference which is the more probable in view of the marked simultaneous changes in the solution pressure, density, and other physical properties. Then, because they are harder than the crystalline metal, their progressive thinning by reabsorption would naturally lead to softening, we know too little of the properties of this amorphous metal to justify our holding that the vagaries in the progress of softening which the authors' record, cannot be referred to corresponding peculiarities in its rate of reabsorption.

The great hardening, strenthening, and embrittlement that pure iron undergoes on rest or on slight heating after cold deformation are not readily referred to any of the four agencies which we have just considered. In order to explain them I attempt to refer them to unknown changes in the nature of either the amorphous sheaths or crystalline fragments which they inclose, or both. If we grant that either or both these agencies are capable of causing these very striking changes, we naturally infer that they may also contribute to a very important degree to the softening that follows this hardening in iron on higher heating, and oc-

curs without prominent hardening in the other metals.

To sum up, stress-relief and grain growth are not likely to contribute greatly to the softening caused by heating overstrained metal. Reorientation may contribute greatly, but it is not likely to be the chief cause. The reabsorption of the amorphous sheaths inclosing the grain fragments, and a progressive change in the condition of those sheaths of the crystalline metal in those fragments, are possible important causes. Beyond this preliminary speculation the present data do not justify our going.

In order to understand the correspondence between the authors' conjectured progress of recrystallization and their observed progress of softening, we must understand the authors' term "fragmental resolution," for which I venture to suggest "limiting grain size." They hold that, for each temperature, there is a certain "limiting grain size," "limiting" in the sense that all grain or grain fragments which are smaller than it, start to grow toward it, but cannot grow beyond it, nor can grains of this or any greater size grow at this temperature. As far as I understand "fragmental resolution" it means this "limiting grain size," a term which I offer reluctantly and only because I find "fragmental resolution" confusing and misleading.

The authors give a most interesting generalization from their hypothesis. This, their conjecture as to the progress of recrystallization, that is of the return to the crystalline state of the metal made amorphous by the deformation, may perhaps be grasped more easily as relettered in Fig. 1. Here ordinates show what percentage of that part of the metal which has thus been made amorphous can recrystallize in rising to given temperature and staying there 30 minutes. Abscissae measure both temperature and the limiting grain size for given temperature. Far from attempting quantitative accuracy, this sketch tries only to show the general family to which the curves are expected to belong.

According to this forecast, the greater has been the previous reduction by cold-rolling, (1) the lower is the temperature at which the curves leave the horizontal axis, that is the temperature at which recrystallization starts, and (2) the steeper is the beginning of the curve. Further (3), whereas after severe deformation the curves are convex upward, after slight deformation they are concave upward. Hence the curves for great reductions form a sheaf of which the top fans out to the right, whereas those of slight deformation form a sheaf of which the bottom fans out to the left.

We have no data showing the true progress of this recrystallization, and hence we cannot check their forecast as to the relation of this progress to the temperature of annealing. But in Fig. 2, I attempt to check it indirectly by showing how the progress of that fraction of the softening which may be referred to recrystallization is related to the annealing temperature. Any such attempt must be very rough, because we do not know what fraction of the softening is due to recrystallization and what to grain growth. In view of the relatively small effect of grain size as such on hardness, I assume that the greater part of the softening is due to recrystallization, and for this rough check I assume that the temperatures given in the second line of Table I are those at which recrystallization becomes complete, on the ground that these are the ones at which the softening is nearly complete.

Table I

Temperature and Softening Data

1.—Percentage of reduction by cold-rolling.	4	8	12	15	25	50
2.—Temperature needed for nearly complete softening, degrees Cent.	750	750	650	550	550	450
3.—Percentage of total softening at that temperature	90.4	98.8	90.0	90.6	79.6	79.2
4.—Lowest temperature of visible disintegration, degrees Cent.	650	550	550	450	350	350

Table II

Hardness Range After Reduction

1.—Annealing temperature, degrees Cent..	*	350	450	550	650	750	800
2.—Hardness after 25 per cent reduction.	27.4	23.6	13.7	11.8	10.2	8.2	7.8
3.—Hardness after 4 per cent reduction.	12.7	12.7	12.0	10.9	9.3	8.0	7.5
4.—Difference, Shore units	14.7	10.9	1.7	0.9	0.9	0.2	0.3

*Unannealed.

Because the heatings underlying investigations of the authors were 30 minutes, because a temperature of 255 degrees Cent. was needed to cause an appreciable softening after 40 per cent reduction in about this time; and because 30 minutes at 200 degrees Cent., caused a slight hardening after this reduction; I set T°_1, the temperature needed to cause the first softening after 50 per cent reduction, at 255 degrees Cent.

The curves of Fig. 2, plotted on these assumptions, tend to support the second and third of the authors' predictions, that the steepness of the beginning of the curve increases with the previous reduction, and that the curves for great reduction are convex upward whereas those for light reductions are concave upward. Their first contention, that the temperature at which recrystallization starts is the lower the greater the deformation has been, has such good direct experimental support that it is to be accepted in spite of its not being clearly indicated by these curves. Note, for instance, that the shape of the 8 and 12 per cent reduction curves suggests that they leave the horizontal axis at temperatures rather below than above those of the 15 and 25 per cent curves.

Is there an equilibrium grain size for each temperature? The authors' assertion to this effect may well be taken rather cautiously in our present ignorance as to the mechanism of grain growth. That this growth accelerates with rise of temperature, and retards itself as it proceeds, seems clear; but that it ceases completely, so that the agencies resisting coalescence come in time to arrest it completely, at relatively high temperatures, has not yet been shown, I believe. A marked retardation as the process proceeds, would naturally occur on almost any theory of grain growth, but that need not imply arrest. If it is true as reported that meteorites often consist of a single enormous grain, that would indicate that, at least in this case, if time is almost unlimited coalescence becomes almost unlimited, and that here the anti-coalescence agencies never become strong enough to cause complete arrest.

The authors' data point to the following laws:

(*A*) As the degree of previous deformation, cold-rolled, increases from a reduction in thickness of 4 per cent to one of 40 or 50 per cent, the temperature at which in subsequent heating reorientation becomes visible under a magnification of 85 diameters falls progressively from 650 degrees Cent., to between 275 degrees Cent. and 300 degrees Cent., the temperature of most rapid softening falls progressively from be-

(*Continued on page* 1056.)

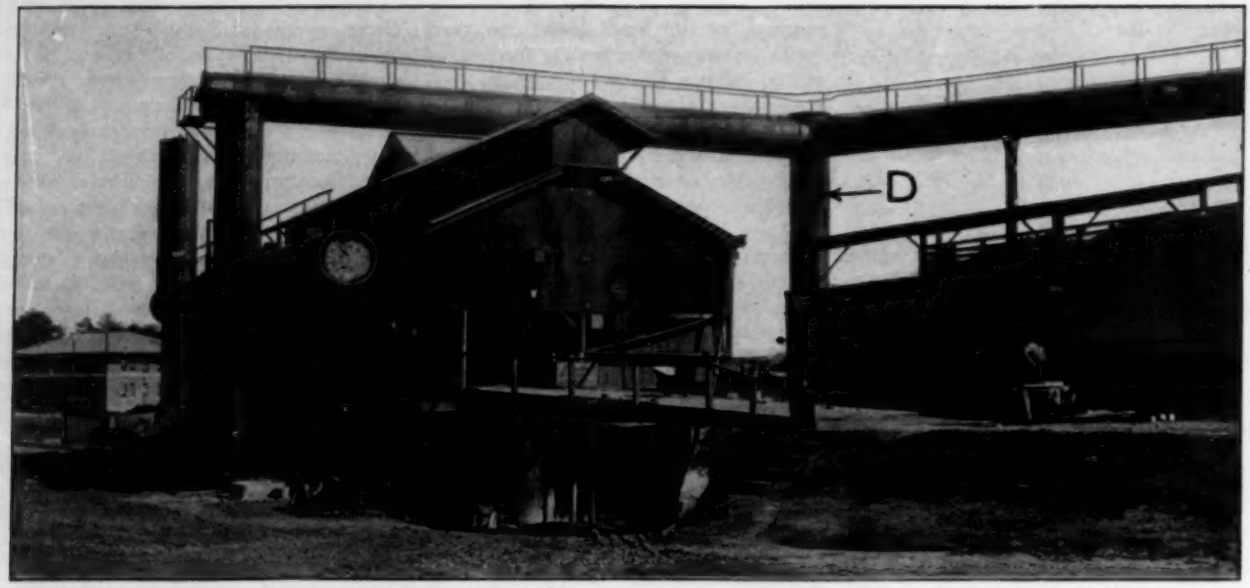


Fig. 1—General View of Producer Gas Plant at Works of American Cast Iron Pipe Co., Birmingham, Ala., Showing Arrangement of Off-Take, Manifold and Overhead Gas Main

Gas Makes Four-Inch Pipe Possible

BY H. COLE ESTEP

BY USING producer gas instead of coke for drying molds, the American Cast Iron Pipe Co., Birmingham, Ala., has made the manufacture of 4-inch cast iron pipe commercially feasible. In most modern pipe shops, where circular pits served by jib cranes are employed, the molds are dried in the pit where they are poured. When using a direct coke fire for this purpose, the American Cast Iron Pipe Co. found that over 10 hours were required to dry 4-inch molds. This resulted in so limited a production, one entire shift being wasted in drying the molds, that it was not possible to sell the product at a price low enough to compete satisfactorily with similar sizes of steel or wrought iron pipe. The molds for 4-inch pipe are much more difficult to dry than those for the larger sizes, owing to the relatively low ratio between the surface exposed and the total volume of sand in the flask. Nevertheless, an extensive demand has been created for cast iron pipe in sizes under 6 inches, due to a large extent to its corrosion-resisting properties. By the employment of gas instead of coke, the time required for drying the molds has been divided by three, resulting in practically tripled production per pit. This increased tonnage has made it possible to market 4-inch pipe on a satisfactorily competitive basis.

Also the use of producer gas in connection with the manufacture of cast iron pipe brings other, incidental advantages. The workmen have a decided preference for gas, not only because much less manual labor is involved than with coke, but also because the temperature of the pits is greatly reduced. With direct firing, the heat in the pits becomes almost unbearable in the summer time. This is specially true in the south. The fact that the pits are cooler when gas is used shows, also, that much less heat is wasted when this form of fuel is burned. Furthermore, if gas is used instead of coke for mold drying, it also may be employed, with virtually no increased

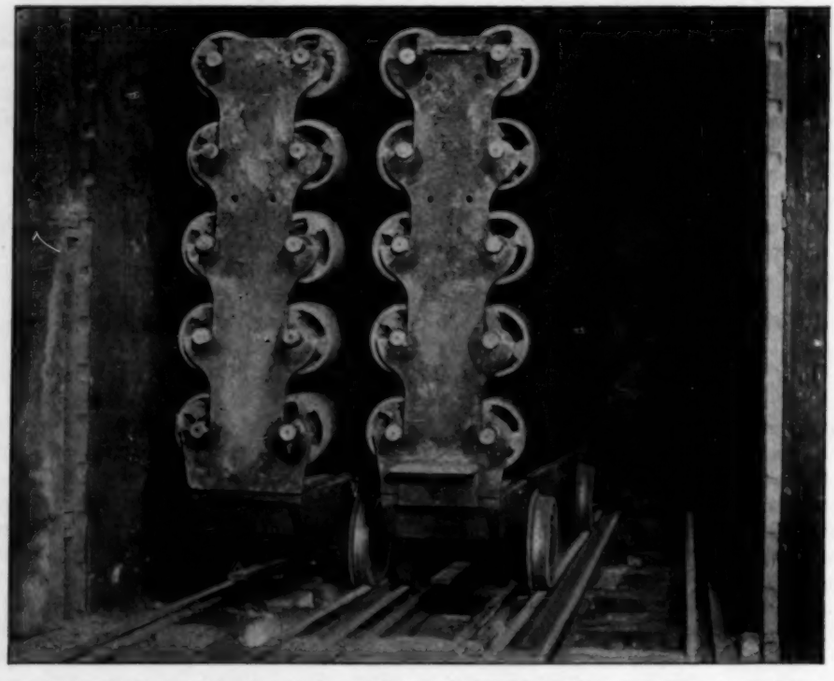


FIG. 2—ONE OF THE PRODUCER GAS FIRED CORE OVENS AT PLANT OF AMERICAN CAST IRON PIPE CO.

expense, for heating core ovens, resulting in appreciably reduced charges for labor and attendance. Few foundrymen appreciate the cost of maintaining several, scattered coke fires under core ovens and ordinary mold-drying ovens. The American Cast Iron Pipe Co. uses producer gas for all drying and heating purposes throughout its works, which is one of the largest in the country.

The experience of this company indicates that producer gas has reduced the cost of drying pipe molds 40 per cent. On 4-inch pipe, the time required for the drying operation has been cut from approximately 12 hours to three hours. From seven to eight hours are consumed in drying 6-inch pipe molds with coke; gas has reduced this time also to about three hours. Proportionate savings are possible in drying molds for the larger sizes of pipe. In addition, the gas greatly facilitates drying the molds for 16-foot, extra-length pipe. Long-length pipe has certain inherent advantages, inasmuch as it contains only 330 instead of 440 joints per mile of line. It is exceedingly difficult, however, to dry 16-foot pipe molds with coke. Gas solves the problem, inasmuch as with this fuel it is possible to heat the mold uniformly throughout its entire length. The American Cast Iron Pipe Co. was the pioneer manufacturer of long-length pipe in the United States.

Labor costs are considerably less with producer gas. When burning coke in its pits, the American Cast Iron Pipe Co. employed eight firemen; at present, with gas, only three are required.

Six Producers Installed

The general arrangement of the producer gas plant of the American Cast Iron Pipe Co. is shown in Fig. 1. Six producers have been installed. They are 13 feet in outside diameter. The diameter inside of lining is 10 feet. This plant turns out 7,000,000 cubic feet of gas per day. The producers, which are arranged in a row, are sheltered by a steel-frame building sheathed with corrugated steel siding. The producer off-takes connect with a 60-inch brick-lined manifold which extends alongside the producer house parallel with the eaves. The manifold delivers the gas to a 60-inch overhead main, shown clearly in Fig. 1. This main conveys it to the pipe foundry. One of the several dust-catchers with which the gas main is provided is shown at *D*, Fig. 1. As this illustration indicates, the dust-catchers are of very simple construction. Workmen who may have occasion to inspect the gas main are protected from falling off by a steel hand rail. The producers are hand-fired and poked and the fuel is handled in buggies.

The gas is made from coke containing 70 per cent fixed carbon, 5 per cent volatile matter, 18 per cent ash and from 7 to 12 per cent water. Coke is used instead of gas coal in order to procure a dry, clean gas. If coal gas is used raw, tar deposits soon clog up the mains, pipes and burners. Such gas may, of course, be cleaned with water, but in this case, the gas absorbs considerable moisture which is liberated on combustion. The steam thus formed condenses in the molds and causes trouble. In the core ovens it is absorbed by the cores. Therefore a dry, clean gas is necessary and this is obtained at the American plant by using coke in the producers. Practically no trouble is experienced from tar deposits. On rare occasions some of the smaller pipes are taken down and cleaned. The burners, also, are cleaned at intervals. Most of the solid particles carried over by the gas are separated-out by the dust-catchers.

Analysis of the Gas

Steam is admitted to the producers with the air blast. Also Eynom-Evans blowers are employed. Under these conditions, an average analysis of the gas is as follows:

	Per Cent
Carbon dioxide, (CO_2)	5.20
Oxygen, (O_2)	0.30
Carbon monoxide, (CO)	26.90
Hydrogen, (H_2)	10.50
Methane, (CH_4)	0.60
Nitrogen, (N)	56.50

This gas contains an average of 134.7 British thermal units per cubic foot. Approximately 64.0 cubic feet of gas are obtained per pound of coke, and therefore 8,621 British thermal units are recovered in the gas, per pound of coke. On leaving the producers, the gas has an average temperature of 450 to 500 degrees Cent. This is reduced to about 100 degrees Cent. in the pipe foundry. Only the large 60-inch main leading from the producer house is lined with fire brick. The smaller distributing mains in the foundry are unlined.

The gas burners present no unusual features of construction. In the 4-inch pipe pits the flasks are arranged in pairs so that two flasks are heated by one burner. Each flask, in this size, contains two molds. The molds are dried in about three hours.

One of the gas-fired core ovens at the plant of the American Cast Iron Pipe Co. is shown in Fig. 2. This oven contains three tracks and has a total capacity of 30 cores. The cores are suspended by arbors in racks of special construction. The gas burners are arranged in three rows underneath the tracks and tests have demonstrated that the ovens are heated uniformly. The gas is controlled entirely from the outside of the oven.

The producer gas apparatus at this plant was designed and installed under the supervision of J. F. Kent, general manager, American Cast Iron Pipe Co, Birmingham, Ala.

Builds Largest Plate Mill

(*Continued from page* 1044.)

The cut-off shear will be located in the shearing building, as will be the side shear, which will be of the same size, and the necessary scrap shears. Between these shears will be located specially designed tables for the handling of wide, long plates. These will take the place of the usual caster roller arrangement. Another set of transfer chains will carry the plates sidewise to the shipping building, where they will be weighed and loaded.

The heating building will contain eight gas-fired pit furnaces, some of them containing three holes, 7 x 9 feet, while the others four holes, 5 x 9 feet. This furnace building will be served by two 30-ton cranes. The main mill building is 70 x 215 feet and contains one 75-ton repair crane for the mill. The cooling building is 100 x 240 feet; the shearing building, 80 x 240 feet, and the shipping house, 90 x 505 feet. Two smaller buildings are located on either side of the main mill building.

The mill has a slack-up of 36 inches, and it will be possible to roll ingots up to 60,000 pounds in weight. All the machinery will be constructed with a view to handling these heavy plates. These large plates will have to be rolled direct from the ingot, but as this is the practice in the Lukens plant at this time, no serious trouble is expected from this. When this mill is operating at its full extent, it is estimated that it will have a rolling capacity of 3,000 to 4,000 tons per week. The new mill will be known as the No. 5 mill, and will be located parallel to the present 140-inch, 3-high plate mill. The position of the two mills and the arrangement of the tables will permit easy transfer of hot ingots between these two units by means of a transfer buggy. By this arrangement ingots can be drawn from the No. 5 mill and rolled in the 140-inch mill, or vice versa.

Will Increase Steel Capacity

To supply the increased metal required to operate the new mill, an additional steel plant comprised of six basic open hearth furnaces of 100 tons capacity each is under construction. There will be room in the building for eight furnaces. These furnaces represent a group, distinct from the present open hearth, and will occupy a separate building close by. Two of the new steel units are

in an advanced stage of completion, and are expected to be fired about Dec. 1. With the six new open hearths in commission, the steel layout of the entire Lukens plant will be made up of 20 basic and two acid furnaces. The estimated annual capacity will be about 500,000 tons of finished plates.

It is evident that an unusual shipping problem will be presented in transporting to the consumers plain plates of 16-foot widths and of corresponding lengths rolled on the new mill. Some of the railroads now have in service well-bottom cars which probably can be used to advantage, especially over stretches of track where there are no tunnels. It is quite possible that it will be necessary for the railroads to have built cars of a new design, especially planned to carry plates of unusual size. The accessibility to tidewater which can be reached from the Lukens plant by a short rail haul, probably will result in much of the largest plate shipments moving by water where the point of delivery is along or nearby the coast.

Burners for Blast Furnace Gas

IN A PAPER which was read at the February meeting of the American Institute of Mining Engineers, K. Huessener, president of the Huessener Engineering Co., Pittsburgh, discussed some of the pertinent considerations involved in the combustion of blast furnace gas in boilers and stoves. The general impression among engineers has been that such fuel was not efficient, particularly the hot, uncleaned blast furnace gas which was reputed to cause very unsatisfactory operating conditions.

One of the chief difficulties encountered when this gas was used under boilers was the deposition of dust and soot in the tubes which necessitated frequent cleaning to maintain the efficiency of the plant. It was, therefore, natural that some attempt be made to clean the gas before using it and the problem was thought to be solved when several satisfactory cleaners were developed. Instead of using the cleaned gas for boilers, however, the gas-fired boiler was relegated to the past and the internal combustion engine introduced as the final solution of the power question.

After these engines had been given a thorough trial, it became evident that they gave high efficiencies only when operating under constant, heavy loads. A compromise developed from this condition which involved the use of a gas engine to carry the heavy, constant loads and a steam engine for the excess loads. This step, concurrent with the development of the steam turbine, again brought to the foreground the problem of burning blast-furnace gas under steam boilers.

One of the most successful blast furnace gas burners which has been developed for use with boilers and stoves is the Bradshaw burner which operates on the venturi principle. Fig. 2 shows the boiler burner. The gas enters the converging section at *A*. The velocity is gradually increased as the gas approaches the throat *B*. At *B* are placed the air openings *C* which are regulated by the adjustable scroll dampers *D*. The pressure of

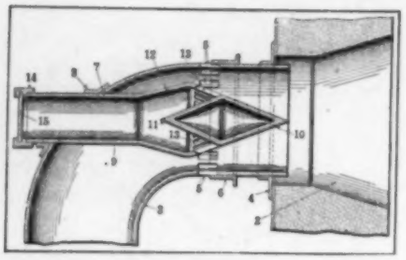


FIG. 1—CROSS-SECTION OF BRADSHAW STOVE BURNER

the mixture is gradually decreased in the diverging tube *E* which ultimately discharges into the combustion chamber. Additional secondary air enters around the tube *E* at *G*. The stove burner is shown in Fig. 1. It is similar to the boiler burner with the one exception that the primary air is admitted internally through the tube shown at 9.

In describing the various details in operating stoves and boilers with the gas burners, the author makes a complete analysis of the many conditions which influence their performance. Particular attention is given to the effects upon efficiency of the many variable qualities and conditions of the fuel itself. The results of a number of tests indicate that the efficiency of the plant is lowered considerably by the presence of unburned CO, being approximately 2.98 per cent decrease for each 100 degrees Fahr. increase in the stack temperature over the boiler house temperature.

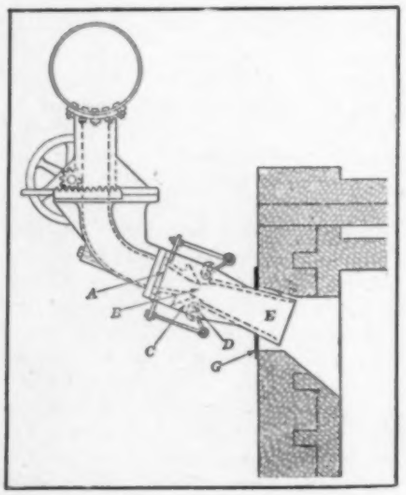


FIG. 2—CROSS-SECTION OF BRADSHAW BOILER BURNER

In discussing the thermal analysis, Mr. Heussener points out the many ways by which the boiler efficiency is impaired. Many socalled efficiency tests lead to erroneous opinions and are the source of contention among engineers, but the fact remains that some record of performance should be kept in order that the operator may appreciate the relative efficiency of his boiler from time to time. For this reason, the author's remarks on the causes of low boiler efficiency are extremely valuable. A number of tables are appended which give the results of a great many tests and investigations made on various installations. These data include figures on nearly every phase of an investigation of the thermal efficiency of a plant.

Recrystallization After Deformation

(*Continued from page* 1053.)

tween 550 degrees Cent. and 650 degrees Cent., to below 350 degrees Cent., the range of temperature in which the greater part of the softening occurs becomes progressively narrower.

(*B*) From this it follows that the annealing temperature needed to cause nearly complete softening is the lower the greater the previous reduction has been, and the longer the annealing period. For a 30-minute annealing the approximate relation is shown in Table I.

(*C*) The temperature-range of most rapid softening merges into a higher range of progressively retarded further softening, which continues in every case even to beyond 750 degrees Cent., suggesting that the softening is due to at least two superposed changes, of which one, probably recrystallization, occurs rapidly at a relatively low temperature—the lower and narrower the greater has

been the cold-rolling—and the other, probably grain growth, is spread out.

(D) The decrease on heating of the excess of hardness is caused by greater deformation. Here we may leave out of account the 2 per cent reduction, because its effects are so slight compared with the accuracy of the Shore method, and the 50 per cent reduction because this refers to a different alloy. The excess of hardness caused by 25 per cent reduction over that caused by 4 per cent, which is 14.7 Shore units before annealing, falls to 10.9 units on annealing at 350 degrees Cent., and to 1.7 units on annealing at 450 degrees Cent. We may question whether this excess remains measurably great after annealing at 550 degrees Cent., or any higher temperature, for though, if we consider the extreme cases, the 4 and the 25 per cent reductions, a slight excess persists even on heating to 800 degrees Cent., as shown in the fourth line of Table II, yet for temperatures above 450 degrees Cent., this excess hardly exceeds the limits of error. Moreover, if we compare all five of the reductions, we find great anomalies. For instance, the specimens reduced by 4 per cent are actually reported as harder than those reduced by either 8 or 12 per cent, after the 650 degrees Cent., 750 degrees Cent., and 800 degrees Cent. annealings severally.

The temperature at which disintegration first becomes visible may suffice to efface the excess of hardness given by greater reduction. This refers to the temperature at which the reorientation becomes visible under a magnification of 85 diameters. For instance, this temperature is 550 degrees Cent., for the reductions of 8 and of 12 per cent, and at this temperature the residual hardness is actually greater after the 8 than after the 12 per cent reduction, though the difference hardly exceeds the limits of observational error. As the temperature rises, the softening accelerates greatly and continuously up to a mixi-mum rate.

Modern Ideas in Heat Treatment

(Continued from page 1049)

may be registered on the indicating instrument. The instruments for this purpose are designed to compensate automatically for the resistance of the leads to the couples. Readings are taken by the zero method on an enlarged scale which indicates only a small fraction of the total scale. This method reduces the possible errors in making instrument readings. Readings on each furnace are taken at 15-minute intervals and are recorded on a log sheet similar to the one shown in Fig. 4 during the duration of the heat treatment of each particular charge.

Check on Operator

The accuracy of the readings made with the pyrometer may be frequently checked by balancing the set against a standard cell, which may be easily switched into the circuit. A mechanical check against error in the pyrometer readings of the operator is provided in the form of a four-circuit recording pyrometer, which may be connected to the circuits of any four furnaces without the knowledge of the pyrometer man. The log of this recording pyrometer enables the engineer to detect any discrepancies in the readings. Under the centralized control system the foreman indicates the desired treatment to the pyrometer man and from this stage on the pyrometer man performs all his work without leaving the control house. When the indicated time for a given treatment has elapsed, the pyrometer man signals the floor man, who proceeds to make the usual tests to determine if the pieces are properly treated before drawing the charge.

Contracts for Blast Furnaces

The Ford Motor Co., Detroit, which recently announced it had completed plans for making castings direct from the mixer, has placed contracts with the Riter-Conley Mfg. Co., Pittsburgh, for two 500-ton blast furnaces, to be about 90 feet high. The stacks will furnish iron for the foundries of the Ford company, which will be increased in capacity.

The blast furnace plant will be built on a site on the River Rouge in Springwell township, about 18 miles southwest of the present Ford works. The Ford company plans to build tractors on the River Rouge site. The Riter-Conley company will build, in addition to the blast furnaces, the stoves, gas washers, skips, buggies and the like.

The Riter-Conley company soon will begin the construction of four complete blast furnaces, 500 tons capacity each, for the Bethlehem Steel Co. at Sparrows Point, Md. The contract includes the structural steel, furnace plate work, furnace castings, gas washers, cast houses, skips, buggies, etc., and will involve about 10,000 tons of steel. Some time ago the Riter-Conley Co. received a contract for about 4,000 tons of steel for mill buildings for the 24 hot-mill plant at Sparrows Point, contracted for by the Baltimore Sheet & Tin Plate Co.

Coke By-Products

Considerable Buying for Pure Benzol For Next Year

New York, Nov. 21.—Talk of the placing of large contracts for toluol for 1917 shipment continues among manufacturers of trinitrotoluol, but the latter still await the closing of unexpected orders from foreign governments for their product before covering on their crude supplies. The overwhelming bulk of the output of toluol of the country in 1917 is expected to be taken up by the makers of trinitrotoluol the same as was true in 1916. Dye and other users of toluol are buying comparatively little of this product. The market consequently still is more of talk than of action. Prices are unchanged with $2 per gallon quoted on contracts and from $2.25 to $2.50 on spot. Considerable buying of pure benzol on contract for the calendar year of 1917 is going forward with prices well settled around 55 cents per gallon. Spot product is irregular in price, due to the continued offerings of resale lots by consumers and middlemen. Some of the largest sellers quote 55 cents, but this price has been shaded considerably on second hand product. The shortage of the prompt supply of phenol continues pronounced and sellers who have been handling large lots of this product report that they have scarcely a pound to offer for immediate shipment. The spot market is strong at 55 cents. Contracts are nominal at 50 cents per pound. Solvent naphtha remains weak, with 25 cents per gallon ruling on large and 30 cents on small lots.

Makers of sulphate of ammonia continue unable to meet the immediate demand, as their output is closely sold up for the next several months. It is with difficulty that a few carloads are scraped up for quick shipment. Prices again are quoted higher at from $3.90 to $3.95 per 100 pounds, at tidewater, or an advance of 5 cents in the week. Some fair lots have brought considerably more than the top figure.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.

Pure benzol	$0.50 to .55
Toluol	2.25 to 2.50
Solvent naphtha	.25 to .30

Per Pound at Producers Plant.

Phenol	.55

Per 100 Pounds at Seaboard.

Sulphate of ammonia	$3.90 to 3.95

Contract.

Per Gallon at Producers Plant.

Pure benzol	$0.55
Toluol	2.00 to 2.25
Solvent naphtha	.25

Per Pound at Producers Plant.

Phenol (nominal)	$0.50

Per 100 Pounds at Seaboard.

Sulphate of ammonia (nearby)	$3.90 to 3.95

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

THE American Steel Export Co., New York, announces that within the past few weeks the following have been added to the organization: W. L. Buck, P. J. Phillips, J. C. Devereaux, K. Siebert J. P. W. Crowell, C. M. Warner and L. M. Simmons. They are all familiar either with steel and metal trade conditions in this country or have had a large selling experience in export markets. Mr. Phillips has specialized on such South American territories as Argentina, Brazil, Chile, Peru and Mexico. He has traveled for nearly two years through all of Central America, Columbia, Ecuador, Venezuela, Guianas, Brazil and West Indies in the interest of the steel industry of this country. In addition to English, he speaks Portuguese and Spanish fluently. Mr. Devereaux has been with the New York district office of one of the large steel companies for the past 15 years and is giving his attention to the same territory, especially the buyers arriving from Europe, Asia and South America. Mr. Crowell has had many years' experience in handling for export to all markets, steel products of every description.

J. H. Lang, L. Vogelstein & Co., 42 Broadway, New York, returned Nov. 17 from a trip to Europe.

L. O. Clarke, president of the American Exchange National Bank, has been elected a director of the Gulf States Steel Co.

William Flatow, L. Vogelstein & Co., metals, 42 Brodway, New York, left last week on a trip to South America, where he will represent the company for an indefinite period.

Frank D. Chase, industrial architect, Chicago, is removing his office from 1345 Peoples Gas building to 429-433 in the same building, where he will have double the space he formerly occupied.

Harold R. Wade, manager of the Pittsburgh branch of the Electro Galvanizing Co., has been appointed general manager of the jobbing plants of the United States Electro Galvanizing Co., with headquarters in Brooklyn.

Edwin Higgins, chief mine inspector of the Industrial accident commission of California, has accepted a position as consulting safety engineer for the California metal producers' association.

Eli Webb, superintendent of the blast furnace department of the Pittsburgh Crucible Steel Co., Midland, Pa., has tendered his resignation, effective Dec. 1.

John Calder, works manager of the Remington Arms & Ammunition Co., Bridgeport, Conn. since July, has resigned and it is reported he will accept a lucrative position in France.

E. B. Shoemaker, of the Coe-Stapley Mfg. Co., Bridgeport, has been made vice president of the Connecticut Brass comporation. Charles P. Lyman, formerly with the W. A. Clark interests, has been made general manager.

V. F. Miessner, for eight years consulting metallurgical chemist and specialist in cupola practice for the American Car & Foundry Co., has resigned to engage in business for himself, and has opened an office at 6976 Ridge road, Chicago.

Ernest Cox, former Pittsburgh representative of R. K. Carter & Co., New York City, has opened an office in the Diamond Bank building, Pittsburgh, as a representative of manufacturers of mill supplies and hardware specialties.

F. H. Wright, formerly of the Illinois Steel Co., has been appointed superintendent of the new 12 and 18-inch structural mills of the Bethlehem Steel Co. W. M. Strawn has been appointed assistant superintendent of machine shops Nos. 1, 2 and 4.

Dr. John A. Brashear, Pittsburgh, the eminent scientist, and Ambrose Swasey, of the Warner & Swasey Co., Cleveland, plan to sail for China from Vancouver, B. C., Nov. 24. They will be accompanied by Dr. and Mrs. A. W. Ferguson, who have been residents of China for 27 years.

R. H. Wood has been appointed manager of the Chicago office of the Modern Tool Co., Erie, Pa., manufacturer of grinding machines and threading tools. Mr. Wood formerly was identified with the Warner-Swasey Co., Cleveland, at the Buffalo office.

L. S. Hubbard, general manager of the W. T. Grant Co., Bridgeport, Conn., has resigned to become secretary of the Eastern Motors Co., Inc., Hartford, Conn., recently organized with a capital of $1,000,000 to manufacture a high grade automobile to be known as the Charter Oak.

Frank L. Blanchard, manager of the Bridgeport Housing Co., Bridgeport, Conn., has resigned to become identified with the Detroit Lubricator Co., Detroit, Mich. He will be succeeded by W. H. Ham, of the firm of French & Hubbard, consulting engineers, Boston.

Rufus B. Allen, formerly superintendent of the C. Pardee Works, Perth Amboy, N. J., has been made superintendent of the steel plant of the Nagle Steel Co., Rahway, N. J. The Nagle company recently acquired the old plant of the New Jersey Steel Co. at Rahway and now is preparing to resume operations.

A. G. Smith has resigned his position as superintendent of the Lowellville open-hearth plant of the Youngstown Iron & Steel Co. and accepted a position as superintendent of the proposed new open-hearth department of the Trumbull Steel Co. He will have charge of the construction work during the erection of the new plant.

George N. Jeppson, works manager of the Norton Co., Worcester, Mass. has been appointed a member of an advisory committee to decide on what form of memorial to Capt. John Ericsson, designer and inventor of the Monitor, of Civil war fame, should be erected in Washington. The committee will meet in New York, Nov. 25.

H. R. Saxon has resigned his position as vice president of the Electric Auto Lite Co., and announced that he will start business again in a similar line of manufacture as the Saxon Mfg. Co., the original name of the Electric Auto Lite Co. The company will locate here and the product of the concern will be sold chiefly to the Willys-Overland Co.

Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Co., has sailed for England. His absence at the present time, when the company is working to full capacity with orders for many months ahead, is believed to foreshadow important developments in its business, either in the way of establishing new departments or securing further large contracts from the Russian and French governments.

Founders Extend Moral Support

Convention Indorses Position of the Railroads—President Barr Makes Interesting Analysis of Election Results—Speeches Made by Prominent Business Men

MORAL support to the railroads in their attack upon the constitutionality of the Adamson eight-hour day was extended by resolution by the National Foundrymen's Association in its twentieth annual convention at the Hotel Astor, New York City, Nov. 15 and 16. The meeting was marked by an earnest and vigorous effort to point out and to combat the eight-hour day and other restrictive labor propaganda; to look ahead to the coming of the day when, the war ended, new conditions of competition and of management must be faced and to arrange for the extension by education, publicity and other co-operative methods, of the principles of just and even-handed treatment for employer and employed.

In addition to an announcement regarding the formation of the National Industrial Conference Board, a medium by which employers of the country hereafter will take united action on all questions of mutual import, as reported in last week's issue of *The Iron Trade Review*, President Wm. H. Barr, in his opening address, gave some interesting conclusions with respect to the recent presidential election in this country. He said in part:

"It is to be hoped that these things will be a lesson to both parties. Because the labor leaders announced their allegiance to the Democratic party in the recent election, employers must not misunderstand the real situation. Both parties have from time to time truckled to this labor vote and have enacted legislation, because of the fear of the labor vote, which was unjust and unfair. Can political parties read aright the recent developments, or must it be shown further and in a more emphatic way that there is no such thing as a labor vote and that organized labor in its recent holdup of congress was masquerading with a black mask and an empty gun?

"Despite the fact that the impotency of organized labor has been shown in the recent election, the fact which the business man must bear in mind most clearly is that the party which has been continued in power in the United States for the next four years has, during the past three and a half years, submitted to the dictates of organized labor, but that party must now awake to the fact that in its bartering with organized labor it was receiving nothing in exchange.

"This point is clear. Business men and manufacturers must redouble their efforts to prevent legislation which is unfair, unjust and sometimes illegal and which is enacted at the behest of labor. Employers of labor must seek through education and publicity and by every fair and honorable means to conserve their own rights and to see to it that legislation which is enacted is based on equity and not on favor. Intelligent co-operation, educational methods and wide publicity are necessary and these things can be done in the broad light of day with effective results. A light has been thrown on the situation by recent events which may be so illuminating that in the future conditions will be better.

"There is one plain lesson in the recent election which cannot be too strongly emphasized. It is that there is no such thing as a labor vote, and that the pretensions of labor leaders that they can deliver a labor vote are absolutely false. For years political parties have been threatened in national elections and in congressional elections as well, with the so-called labor vote. If they did not grant the demands of the labor organizations. These demands were not only excessive in many cases, but were illegal and unjust. Despite the fact that year by year the labor vote as a unified proposition was shown to

The New Council

The new administrative council is made up of the following members:

First District.

D. K. Bartlett, Builders' Iron Foundry, Providence, R. I.
F. C. Fromm, Manufacturers' Foundry Co., Waterbury, Conn.
W. A. Stevenson, Norwood Engineering Co., Florence, Mass.
A. E. Newton, Reed-Prentice Co., Worcester, Mass.
Enoch Shenton, Wm. Highton & Sons Co., Nashua, N. H.

Second District.

Edward Norris, Utica Heater Co., Utica, N. Y.
D. W. Sowers, Sowers Mfg. Co., Buffalo.
H. P. Macdonald, Snead & Co. Iron Works, Jersey City, N. J.
James H. Caldwell, Ludlow Valve Mfg. Co., Troy, N. Y.
A. S. Blagden, American Malleables Co., Lancaster, N. Y.

Third District.

Ely Griswold, Griswold Mfg. Co., Erie, Pa.
Wm. S. Hallowell, Harrison Safety Boiler Works, Philadelphia.
C. S. Koch, Fort Pitt Steel Casting Co., McKeesport, Pa.
J. Turner Moore, Reading Steel Casting Co., Reading, Pa.
John E. Thropp, John E. Thropp's Sons Co., Trenton, N. J.

Fourth District.

Jos. J. Wilson, Cadillac Motor Car Co., Detroit.
Geo. O. Rockwood, Rockwood Mfg. Co., Indianapolis.
Charles F. Seelbach, Forest City Fdy. & Mfg. Co., Cleveland.
Samuel Blackburn, John B. Mooris Foundry Co., Cincinnati.
E. R. Frost, National Machinery Co., Tiffin, O.

Fifth District.

James F. Lardner, Rock Island Plow Co., Rock Island, Ill.
H. T. Hornsby, United Iron Works Co., Springfield, Mo.
E. E. Baker, Kewanee Boiler Co., Kewanee, Ill.
W. H. Winslow, Winslow Brothers Co., Chicago.
John B. Strauch, More-Jones Brass & Metal Co., St. Louis.

Sixth District.

W. W. Coleman, the Bucyrus Co., So. Milwaukee, Wis.
C. A. Luster, Clyde Iron Works, Duluth, Minn.
Max W. Babb, Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fred M. Prescott, the Prescott Co., Menominee, Mich.
John G. Osborne, Lakeside Malleable Castings Co., Racine, Wis.

Seventh District.

John M. Taylor, Taylor-Forbes Co., Ltd., Guelph, Ont.
W. F. Angus, Canadian Steel Foundries, Ltd., Montreal, Que.
A. R. Goldie, the Goldie McCulloch Co., Ltd., Galt, Ont.
Geo. W. Watts, Canada Foundry Co., Ltd., Toronto, Ont.
H. Cockshutt, Cockshutt Plow Co., Brantford, Ont.

Eighth District.

W. D. Trabue, Phillips & Buttorff Mfg. Co., Nashville, Tenn.
Z. W. Wheland, the Wheland Co., Chattanooga, Tenn.
W. D. Tynes, Hardie-Tynes Mfg. Co., Birmingham, Ala.
E. Y. Hartwell, Hartwell Iron Works, Houston, Tex.
Geo. R. Lombard, Lombard Iron Works & Supply Co., Augusta, Ga.
O. P. Briggs, of Minneapolis, was elected an honorary member of the council.

be mythical, politicians have catered to labor leaders and in many cases have consented to the enactment of unjust legislation to placate or conciliate organized labor. The lesson of the recent election is so very plain that it seems to me in the future there will be less trucking to labor and more independence on the part of political parties so that legislation will not be tainted by favoritism or political maneuvering for votes.

"For the first time, organized labor, through its spokesmen, came out in favor of one particular party in the recent election. At other times, it may have indicated sympathy, but in the recent election the American Federation of Labor and the various railroad brotherhoods, through their leaders, threw their fortunes with the Democratic party and insisted that all their followers vote for the candidates of that party. The first effect of this declaration was resentment on the part of the members of the unions, but this did not prevent the leaders from insisting that by their votes they would elect the candidates of the Democratic party, which, they asserted, had done so much for them through legislation.

"Organized labor is strong in the manufacturing states, and it is negligible in the agricultural states. The election results show that the Democrats were defeated in the manufacturing state, with perhaps one exception, due to local conditions, and were successful in the agricultural states where organized labor had scarcely any membership at all."

Open Shop Inducements

Commissioner A. E. McClintock, in his report, referred to the apathy of independent molders in joining the unions and explained this by the fact that work had been exceedingly plentiful and the rate of pay in the open shop plants had been in excess of that in closed shops. The open shops free of union restrictions, have offered the better inducements. Such strikes as have been waged by the unions during the year have been for two objectives; for the eight-hour day or for control of the shops. The wage question has not been prominent. There were no strikes where wages have been the only issue. Reference was made to the successful work of the association in combating the eight-hour day. Speaking of the crippling effect that the eight-hour day would impose upon the foundry industry, Mr. McClintock said:

"A conservative estimate is that there are 100,000 molders and coremakers employed in the United States and Canada exclusive of stove shops. Fully one-half of them work on a 10-hour basis. To place them all on an eight-hour basis, would mean a reduction in working hours of fully 150,000 per day. This means that 18,750 more molders would have to be employed to do the work now being done by the 100,000. These figures are startling, but convincing. It is not necessary to explain that the men to do this work are not available. If the eight-hour day was established in the foundry, a further curtailment of production would at once take effect. This country was never built on an eight-hour basis, and what we now need is more production in 10 hours with proper remuneration."

The commissioner stated that pig iron producers have estimated that foundry production for a number of months has been curtailed from 25 to 30 per cent, due to shortages and inefficiency of labor.

Secretary's Report

The report of Secretary J. M. Taylor showed that 27 firms had been admitted to membership in the year with a net gain of three plants. The number of molders and coremakers employed by the members increased over 35 per cent, making the average for 1916 the largest in the history of the organization. Mr. Taylor stated that the year, above all others, has emphasized the need of a more comprehensive educational campaign among the workmen. The fact that employes who were getting higher wages than ever before can be influenced to strike under prevailing conditions illustrated, he thought, the result of the mass of literature that had been sent forth constantly by the unions for a period of years.

The New Officers

President: Wm. H. Barr, Lumen Bearing Co., Buffalo.

Vice-President: H. J. Boggis, Taylor & Boggis Foundry Co., Cleveland.

Secretary: J. M. Taylor, Chicago.

Treasurer: Chicago Savings Bank & Trust Co.

Meeting New Problems

Prominent figures in the commercial world addressed the convention Wednesday afternoon and urged deep thought and energetic action be taken by business men looking toward the meeting of new problems of competition and administration following the present war.

Frank A. Vanderlip, president of the National City bank, New York City, responding to an address—"The Banker's Relation to Industry"—made a strong plea for business men to look above their desks; to think deeply of the fundamental problems affecting all business and society and to bring forth real statesmanship in business affairs. Mr. Vanderlip divided all commerce in three classes, production, transportation and banking, and said that each field was equally important and mutually dependent upon the others to produce successful industry. The fundamental problem affecting business and society relates to government. Mr. Vanderlip told of recent conversation with a French banker in which the latter, speaking of the great changes in government likely to come out of the present war, stated that, in his opinion, it had been proved that democracy in its present form, is a failure. As to the weaknesses of a democracy like the United States, Mr. Vanderlip said he believed one of the greatest was that it tended to bring mediocrity into legislative places. It is peculiarly important today that more businessmen should consider how their best interests can be served in public life and to supplant expert for mediocre representation. The United States in the future will be obliged to meet entirely new relations between government and business among European countries which will make it more difficult to compete. Adroit tariffs are to be expected and these must be met, not by the log-rolling tariffs of the past, but by equally adroit and scientific measures. The future will see the influence of governments in the shipping business to a larger extent than ever before. The great fallacy in the belief of labor that restriction of production is beneficial to this class, must be rooted out by education.

Statesmanship in Business

"The message I bring to you is that we want statesmanship in business, men who think broadly on social and economic lines, as well as sympathetically and clearly," said Mr. Vanderlip. "It is up to you business men to consider things in the large, to find time to look up from your desks and to make your voice heard and your wisdom of influence in that legislation affecting business which forms so much of legislative action today. The business man no longer can expect to enjoy the fruits of his labor uninterruptedly; he must devote some of his time to good citizenship and toward the bringing of statesmanship into business."

E. W. Rice Jr., president of the General Electric Co., spoke on "How Shall Manufacturers Contribute to American Industrial Progress"? He stated that there were many indica-

tions that, upon the termination of the present European war, there would begin what might be termed an industrial war in which the United States would not be permitted to remain neutral. One of the great industrial problems of the country is to obtain real co-operation between the men and women engaged in industry extending from the president and executive officers down to the humblest wage-earner. Today there is a serious lack of mutual understanding between employer and employed, due to a lack of an intimate knowledge of conditions affecting each. The employer must take an increased personal interest in his men as men. The employe must be convinced that all limitations of productive activity or restrictions of output are suicidal and result in waste, inefficiency, high cost and poor business. Mr. Rice expressed the belief that experience and co-operation of manufacturers through the meeting of the Industrial Conference Board will make progress in the solution of these problems and will inspire broader co-operation to include both the public and the government.

Ely Griswold, of the Griswold Mfg. Co., Erie, talked on the proposal for increasing the effectiveness of the National Foundrymen's Association; Edward Kneeland, of the United Engineering & Foundry Co., on the Pittsburgh strike situation; Edward K. Nicholson, counsel for the Bridgeport Manufacturers' Association, on the responsibility of the individual employe; and W. H. Van Dervoort, president of the National Metal Trades Association, on the work of the joint conference board on apprentices.

At the banquet Wednesday evening, Frederick P. Fish, of Fish, Richardson, Herrick & Neave, bankers of Boston, chairman of the National Industrial Conference Board, spoke regarding the scope of the new industrial organization.

"During the next 10 years, the United States will be confronted by new and complex problems in industry and finance," said Mr. Fish. "It is impossible to predict at this time how serious these problems may be, but it is perfectly safe to say that the only way to meet them is by a knowledge as perfect as possible of the fundamental facts and causes existing in the situation. It is necessary at the outset to know precisely the condition of things as they are today, to understand the various elements entering into our manufacturing industry, to analyze and study all the points which go to make a prosperous manufacturing industry.

"The new conference board is created for the purpose of making a detailed study of the manufacturing industry in all its various phases and in its relation to the public, to the wage earner, and to the government. This study will develop that knowledge which will be necessary to meet the problems of the future. Item by item the details of the industry should be analyzed by men who are thoroughly familiar with conditions, and who will seek out the causes and the remedy. Confidence is inspired by knowledge, and antagonism thrives in ignorance. During the past years, conditions have arisen which have inspired antagonism and it is common knowledge now that these things could have been avoided by a compiete and mutual understanding of all the facts in the case. The purpose of the board is to develop a full knowledge of all the facts, disseminating this knowledge, inspiring the various members of the association and all who are interested in our industries with a desire to co-operate in the plans of the board, and in this way bring about, not only co-operation among manufacturers, but between manufacturers and the public. The purpose and spirit of the new conference board is a patriotic one, and it will attempt to earn the confidence and approbation of the people of the United States."

Jas. A. Emery, of Washington, gave to the diners the story of how San Francisco is reclaiming herself from a hotbed of radical unionism to a new order of civic courage and of enforcement of legal authority. Following a waterfront strike during the summer, during which the unions repudiated their contracts with their employers, the chamber of commerce of San Francisco established a law and order committee and with voluntary contributions of $1,000,000, proceeded by injunction and damage suits in the courts permanently to abate the picketing nuisance and brought home to the law-abiding unions their joint responsibility for the reckless and illegal acts of their common agents. The result of this movement is that San Francisco has adopted, at the recent election, an anti-picketing ordinance, by a majority of 5,000. The chamber of commerce, by a campaign of education has endeavored to draw a clear distinction between the use and abuse of collective action and to impress upon the community that no class should be allowed to promote its special interests at the expense of all.

Foundrymen Strike at Adamson Law

The following was unanimously adopted:

Whereas, a serious question of grave national importance has arisen relative to the conflict between the Constitution of the United States and the so-called Adamson law, which law seeks to compel railway systems of the country to raise the wages of certain of their employes under the pretense of compelling an eight-hour work day, and

Whereas, the railway systems of the country have indicated their opposition to the enactment and operation of that law, claiming said law to be in violation of rights guaranteed all citizens by the Constitution of the United States, and

Whereas, further, the Constitution of the United States guarantees to every citizen the right to test through the courts of the land any act designed to deprive him of life or liberty or property without due process of law, now, therefore, be it

Resolved, that we, the National Founders' Association, manufacturers and shippers of products in the various states of the United States, declare that this right to have their cause determined by judicial proceedings should be secured to the railway systems of the country and that this association approve of their attitude in the maintenance of that right.

Quick Service

Toledo, O., Nov. 20.—An example of service as applied to the manufacture of mill building steel is given by C. A. Peckham, manager of the Toledo Bridge & Crane Co., of this city. An order for 900 tons of structural steel was received from a concern in Cleveland, the drawings made, the steel purchased, fabricated and shipped in 30 days. Three of the five cranes ordered by the American Steel & Wire Co., of Cleveland, have been delivered, and the other two will be shipped soon. An order for 12 cranes ranging in capacity from 5 to 25 tons each, has been received from the American Sheet & Tin Plate Co., Gary, Ind. About 1,200 tons of steel are being handled through the factory monthly. The management also reports a 50 per cent increase in business over last year and sufficient orders on hand to keep the concern working to capacity during the coming years.

The Doehler Die Casting Co., Court and Ninth streets, Brooklyn, has let a contract to the Turner Construction Co. for a steel and concrete addition to its die casting plant. This will be a 7-story structure, 50 x 100 feet, to cost approximately $150,000.

Old Furnace

Has Been Rebuilt and Will Be Blown in at an Early Date

Whitesburg, Ky., Nov. 20.—The old furnace of The Intermont Coal & Iron Corporation near Big Stone Gap east of here in the Virginia coal fields has been re-constructued with all possible haste and it is expected that the furnace will be blown in within the next few days with an increase to at least 500 tons daily capacity. Work is also being rushed as rapidly as possible on development of iron mines and the promoters expect to have ample ore to keep the furnace running uninterruptedly for some time. They are making some new purchases of adjoining properties said to be unusually rich in iron ore that will produce large quantities. This is said to be some of the richest properties in the south.

During the summer months, R. T. Irvine and others reorganized and reincorporated The Intermont company with a capital of $500,000. At this time they have ample capital behind them to make the industry a success. R. T. Irvine is president and general manager of the company. He will have personal supervision over the work a large part of the time. Hundreds of men are being employed.

Reports from Max Meadows are to the effect that the iron plant at that place is billed to be blown in within the next two weeks. Some extensions are also planned by that company which will necessitate the employing of a goodly number of new men. The present high prices prevailing are responsible for the activity now in progress throughout this section.

Will Enlarge Plant

The American Tube & Stamping Co., Bridgeport, Conn., has been sold to Guy P. Miller, secretary and treasurer of the Bridgeport Brass Co., who is understood to head a syndicate of New York financiers who will greatly enlarge the plant. Negotiations for the deal have been pending nearly a year. Charles G. Sanford, treasurer of the American Tube & Stamping Co., which employs 1,500 men, says the purchasers are experts in the steelmaking business, and will take over the operations of the company about Dec. 1. They plan to build new furnaces, add new machinery and to expend a large amount of money to further develop the plant and increase its efficiency. The company was incorporated June 20, 1899, with $2,800,000 capital, its output consisting of basic open hearth carbon and Swedish steel, billet and slabs, hot and cold rolled strip steel for springs, pressed, stamped and drawn work. Sheet metal stampings form a large department of manufacture. The officers of the company of the company were C. D. S. Miller, president; C. G. Sanford, vice president and treasurer; Percy S. Hill, secretary, and Arthur H. Wheeler, assistant secretary.

Increased Rates

The Equitable Gas. Co., the Allegheny Heating Co. and the Monongahela Natural Gas Co., operating in western Pennsylvania, have filed notices of an increase in rates to industrial concerns, with the Pennsylvania Public Service Commission. The present rates for gas for industrial consumers are 28½ cents per 1,000 cubic feet for the first 250,000 cubic feet used in any calendar month; 21 cents per 1,000 for the second 250,000 cubic feet; 19 cents for the next 500,000 and 17 cents for all in excess of 1,000,000 cubic feet. The gas companies asked for a rate of 28½ cents per 1,000 cubic feet for the first 1,000,000 cubic feet and 19 cents per 1,000 for all in excess of 1,000,000 cubic feet.

Numerous mills in western Pennsylvania, eastern Ohio and West Virginia have been seriously handicapped recently on account of shortage of gas. Some large mills have been closed in part.

Its Best Month

October proved the best month in the history of the National Enameling & Stamping Co., both gross and net profits reaching new high figures. Next week the National's new rolling mill at Granite City, Ill., will begin operations, turning out both light and heavy sheets and bars for outside consumption as well as for company use. For the present, however, the company will absorb about 50 per cent of the output, the remainder having been contracted for by one of the big equipment concerns.

Sold for Two Millions

The Becker Milling Machine Co., Boston, manufacturer of vertical milling machines, has been sold by ex-Governor Eugene N. Foss, of Massachusetts, to the Manufacturers Co., of which Robert F. Herrick is president, for $2,000,000 cash. It will be operated independent of the many other enterprises in Massachusetts of which Mr. Herrick is at the head. Mr. Herrick will succeed Mr. Foss as president.

Great Activity

In Developing Eastern Kentucky Coal Properties

There is unusual activity prevailing throughout the whole of eastern Kentucky's rapidly developing coal field at this time, with a large number of new companies coming into the territory. One of the latest companies formed is The Edgewood Coal & Coke Co. with a capital of $600,000, the incorporators being R. B. Parker, Syracuse, N. Y., W. W. Stevenson, D. H. Putnam, P. K. Mallr and G. H. Gray, of Ashland, Ky. Initial development work will be started within the next few days of the Edgewood coal properties on the Baltimore & Ohio railroad in Pike county.

Another, the Detroit-Elk Coal Co., was organized with $50,000 at Lexington a few days ago by S. L. Bastin, T. D. Cassidy, C. C. Winters, J. F. Konig, Dr. W. E. Bannister and H. C. Faulkner. This company will begin at once a development of the W. H. Potter coal land tract near Kona (Mater postoffice), Ky. on the main line of the Louisville & Nashville. S. L. Bastin will have change of the work.

At Hellier, Pike county, The Kentucky Solvay Co., recently incorporated with $1,000,000 capital, is beginning the work of development of several thousand acres leased from a Boston syndicate along Marrowbone Creek on the Chesapeake & Ohio railroad. They will build 100 additional coke ovens beginning the new work Dec. 1. These ovens wll be built on the latest, modern bee-hive plans.

The Kentucky-Detroit Coal Co., organized for development mostly by Detroit capitalists a few weeks ago, is getting pretty well under way on a first class development of the May properties on Robinson Creek in Pike county, where a short line spur of the Baltimore & Ohio will reach the work. An electrically equipped plant with a capacity of several thousand tons daily is to be put in process.

Extends Bonus Plan

The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has extended its bonus system to all salaried and office employes of the company. The extension puts all the employes of the corporation, numbering between 17,000 and 18,000 on the bonus plan. Employes will receive a bonus of 8 per cent of their salary each month, providing their total excusable time for absence and tardiness during the month does not exceed six hours, incurred on not more than three occasions. An additional 4 per cent will be given employes who have not lost any time during the month.

Iron and Money: Fact and Comment

New York Ship Building Co. Acquired by American International Corporation and Allied Shipping Interests—Brier Hill Steel Co. Buys Steel Sheet Plant

OFFICIAL announcement is made that the plant of the New York Ship Building Co., Camden, N. J., has been acquired by the American International Corporation in conjunction with the International Mercantile Marine Co., Pacific Mail Steamship Co. and W. R. Grace & Co. by a transaction involving about $15,000,000. The plans of the buyers provide for the organization of a new corporation, the majority interest of which will be held by the several companies interested. The present company will be liquidated and the stockholders probably paid off in cash. Some of the new stock may be offered for public subscription. In their official announcement, the new owners state that the company has present contracts filling its total capacity through 1917. It is proposed to assist in executing the naval program of the government, and this work together with private business on hand or in contemplation, it is said, will take up the entire present capacity of the yard and of proposed extensions for the next five years. The character of these enlargements is not given in detail, but it is stated they will be very extensive. The New York Ship Building Co. has been operating one of the largest ship yards in the country, consisting of five ways with an annual capacity of about 100,000 tons. The company was incorporated in New Jersey in 1889 with an outstanding stock of $5,000,000 and a bonded debt of $2,000,000. The controling interests in the company for a number of years have been Henry C. Frick, A. U. Mellon, Pittsburgh banker, and Henry Walters, of New York.

Steel Stocks Make New High Records

Speculation has run riot in steel shares the past week, appearing to reflect a belated appreciation by the stock market of current profits in the history. Fully a dozen steel stocks attained new high record prices on the New York and other exchanges in the past few days, including United States Steel common, Bethlehem common and preferred, Republic Iron & Steel common, Lackawanna Steel, Inland Steel, Carbon Steel, La Belle Iron Works, Gulf States Steel common and second preferred, Brier Hill Steel common, Atlantic Steel common, Sloss-Sheffield Steel & Iron common and others. Quotations on a number of iron, steel and industrial stocks at the close of the New York stock exchange Nov. 18 and net changes for the preceding week follow:

	Close Nov. 18.	Net chg.
American Can	66⅛	+1⅜
American Can, prfd.	114	—1
Amer. Car & Fdy.	73⅝	+3⅜
Amer. Car & Fdy., prfd.	117	.....
American Locomotive	94⅛	— ⅛
American Locomotive, prfd.	108	—1
American Steel Foundries	68⅜	+3⅛
Baldwin Locomotive	86½	+ ⅝
Baldwin Locomotive, prfd.	107	+ ⅜
Bethlehem Steel	700	+35
Bethlehem Steel, prfd.	168	+16
Colorado Fuel & Iron	59⅛	+5⅛
Continental Can	102½	+1½
Continental Can, prfd.	113	.....
Crucible Steel	91½	+1½
Crucible Steel, prfd.	123½	+1½
General Electric	182	+2⅛
Gulf States Steel	160	+37
Gulf States Steel, 1st prfd.	105⅜	+2⅜
Gulf States Steel, 2d prfd.	165	+36
Internat'l Harv. of N. J.	117¾	— ⅛
Inter. Harv. of N. J., prf.	120	+2⅛
International Harv. Corp.	80½	+ ½
Internat'l Harv. Corp., prfd.	111¼	+ ¼
Lackawanna Steel	104½	+8¼
Nat'l Enmlg. & Stamp. Co.	34⅛	+2
Nat'l En. & Stmp. Co., prf.	100½	+1½
Pressed Steel Car	87½	+11¼
Pressed Steel Car, prfd.	105½	.....
Pullman Palace Car	168	— ⅜
Republic Iron & Steel	90¼	+9½
Republic Iron & Steel, prfd.	116⅜	+1⅜
U. S. C. I. Pipe & Fdy. Co.	27¼	+2¼
U. S. C. I. P. & F. Co., pr.	67⅜	+ ⅜
United States Steel	126¼	+3¼
United States Steel, prfd.	121⅜	.....
Westinghouse Mfg. Co.	65⅜	+ ⅜

Maximum quotations for a number of leading iron and steel securities not listed on the New York stock exchange, as of Nov. 17 and Nov. 10, compare as follows:

	Nov. 17.	Nov. 10.
American Radiator	...	420
American Ship Building	67½	72
Cambria Steel	135	140
Chicago Pneumatic Tool	73½	73
LaBelle Iron Works	84	81¾
Lake Superior Corp'n	29⅛	28⅝
Stewart-Warner Speed. Co.	109	111½
Warwick Iron & Steel	10	10
Westinghouse Air Brake	155	155
Westingh'se Elec. & Mfg. Co.	66⅛	67½

Brier Hill Steel Buys Warren Plant

Decision of the Brier Hill Steel Co., Youngstown, O., to buy the Western Reserve Steel Co., Warren, O., is another step in the surprising growth of this enterprising valley steelmaker.

The Brier Hill Steel Co. will take possession of the Western Reserve plant about the first of the year, under the superintendency of W. W. Lewis, present operating head of Western Reserve. Addition of the eight hot mills of the Western Reserve to the Brier Hill's 20 such mills will make the latter corporation one of the largest sheet producers in the valley. President W. A. Thomas, of the Brier Hill company, in announcing the new purchase made the following statement:

"The plant of the Western Reserve Steel Co. is most modern in every respect and exceptionally well equipped for making different sizes and highly finished sheets that are not now made by the Brier Hill Steel Co. at its two plants in Niles. These additional facilities are very desirable and will put the Brier Hill Steel Co. in a position to produce everything in the sheet steel line that the trade requires."

The Western Reserve Steel Co. has a plant with six sheet mills at Warren, with a production of about 50,000 tons of black and blue annealed sheets. The company was organized in May, 1914, with authorized capital stock of $250,000 7 per cent cumulative preferred stock and $350,000 common stock. Although the company's existence has been brief, it has been extremely prosperous under the capable management of President C. G. Thomas, formerly a director of the Brier Hill Steel Co.

The company's funded debt at the beginning of 1916 amounted to $150,000.

Financial Crop Ends

Directors of the Gulf States Steel Co. at a meeting last week elected Lewis L. Clarke, president of the American Exchange National Bank, of New York City, a director. Directors declared the regular quarterly dividend of 1¾ per cent on the first preferred stock, payable Jan. 2, 1917, to stock of record Dec. 15, 1916.

* * *

Stockholders of the Carbon Steel Co., Pittsburgh, at their annual meeting Nov. 13, elected the following directors: Charles McKnight, George S. Macrum, Dean R. Wilson, Charles E. Middleton, Raymond S. Baldwin, C. F. Blue Jr., Holland S. Duell. The directors elected the following officers: President, Charles McKnight; vice president and treasurer, Dean R. Wilson; vice president and general sales agent, C. F. Blue; secretary, W. W. Noble. Charles McKnight, Dean R. Wilson and Charles E. Middleton are members of the executive committee.

Easy Profits

Have Demoralizing Effect on Business, Says Colonel Pope

Chicago, Nov. 20.—Sessions of the American Mining Congress last week brought together a large number of mining men from all parts of the country and from all branches of mining. Discussions of various phases of the industry were comprehensive and much information was disseminated as a result of the meeting.

Walter Douglas, of New York, connected with the Phelps-Dodge interests, was elected president. The three vice presidents are Charles M. Moderwell, of Chicago; George H. Crosby, of Duluth, and L. A. Friedman, of Lovelock, Nev. James F. Callbreath, of Denver, was re-elected secretary. The directors are W. R. Richards, of Pottsville, Pa.; M. S. Kemmerer, New York City; Irving T. Snyder, Denver, and George H. Crosby, Duluth.

While the matter of the next meeting place is left with the directors to decide, Birmingham, Ala., is a strong contender and may succeed in landing the sessions.

At the closing session and banquet, Col. George Pope, of Hartford, Conn., president of the National Association of Manufacturers, outlined the effort of his association to unite for cooperation all the associations representing the big industries of the country. Carl Scholtz, retiring president, pointed out that the present activity and prosperity of the mining industry is the result of foreign demand, and after the close of the war our present customers will become competitors, with their wits sharpened by the hardships of war. To face this competition, the industries of this country are not well prepared, being softened and careless because of the easy profits being made now in a time of limited competition.

Building New Plant

The Burnside Steel Co., 548 Railway Exchange building, Chicago, which is erecting a converter foundry plant at Ninety-seventh street and Kimbark avenue, in the industrial suburb of Burnside, is making excellent progress in construction. The main building, 80 x 200 feet, with a central bay 40 feet wide, is practically completed, and equipment is being received, with definite promise of the remainder arriving within a short time. It is hoped to have the plant operating shortly after Jan. 1. A 1-ton tropenas converter will be installed at the start, and additions made later as circumstances may dictate. An electric traveling crane of 7½ tons capacity is provided, and spans the central bay. An office building, 30 x 50 feet, is nearly completed. The company has a tract containing between five and seven acres, which provides sufficient space for enlargement in the future.

New Sandusky Company

The Sandusky Forge Co., capitalized at $300,000, has been organized at Sandusky, O. The officers are: President, J. Barrows, prominent manufacturer of Jamestown, N. Y.; vice president, M. E. Crow, president of the Crow-Elkhart Motor Co., Elkhart, Ind.; secretary and treasurer, W. H. Collier, identified with the Collier Truck Co., Painesville, O. The other directors are: S. H. Penfield, who is connected with the Salsbury Wheel & Mfg. Co., Jamestown, N. Y., and the Peru Auto Parts Co., Peru, Ind.; E. D. Sherman, Herman Haas and George P. Chambers, secretary of the Federated Commercial Club, Sandusky. The company has purchased a complete forging equipment, which it expects to receive in about two weeks.

Planning to Build

L. P. Featerstone, of Beaumont, Texas, president of the Texas Iron and Steel Co., which plans to build an open hearth plant at Beaumont, has obtained a favorable freight rate on limestone shipments from quarries near Austin for fluxing purposes from the state railroad commission. He is also assured of a freight rate of $1 per ton on ore shipments from the company's ore beds in Cass and adjoining counties to Beaumont by the Santa Fe railroad. Mr. Featerstone says that the proposed plant will have an initial capacity of 300 tons per day. He estimates that the ore beds which the company owns contain a supply to run the plant for 40 years. The company has a capital stock of $2,500,000. Preliminary details preparatory to beginning the construction of the plant are being rapidly worked out, said Mr. Featerstone.

A new list of discounts for wrought iron pipe, effective Nov. 15, 1916, has just been issued by the A. M. Byers Co., Pittsburgh. In addition to the usual tabulated discounts, a few paragraphs regarding trade customs and methods of marking pipe are presented.

Merger Announced

Cleveland Auto Parts Companies Are Consolidated

Merger of the Perfection Spring Co. and the Standard Welding Co., both of Cleveland, is formally announced. The consolidation will be called the Standard Parts Co. and will have an authorized capital stock of $10,000,000 7 per cent cumulative preferred stock and $25,000,000 common stock. Only half of the preferred stock will be issued at this time and only $8,000,000 of the common. Of the preferred, $4,000,000 will be offered by Borton & Borton, Cleveland, to investors, at par The common has been underwritten by a syndicate and will not be offered to the public.

The consolidation has the backing of large motor interests in and out of Cleveland. Directors will include H. P. McIntosh Sr., F. F. Prentiss, H. P. McIntosh Jr., T. E. Borton, Christian Girl and Ernest W. Farr, all of Cleveland, and Arnold H. Goss, of New York. The new company has contracts with the Perlman Rim Corporation which will enable the Standard Parts Co. to manufacture Perlman rims at a fair profit. The new company will be the largest maker of automobile springs in the world and will be an important producer of light gage steel tubing, automobile rims, bands and bases for solid tires, bicycles and motorcycle form parts. The tubular product is also used by manufacturers of metal furniture, electrical appliances, telephones, chandeliers, typewriters, etc.

Buying Coal Lands

Whitesburg, Ky., Nov. 20.—A tract of a little over 3,000 acres of valuable Elkhorn coking coal and by-product properties lying along the waters of the North Fork of the Kentucky river and Rockhouse Creek in this (Letcher) county is being purchased this week by West Virginia parties of which H. S. Garney is at the head, for immediate development, it is said. The properties are being purchased from The Letcher County Coal & Improvement Co. of this city. While the price paid is not stated officially, it is believed to be about $100 per acre. According to announcement, the development work will begin within two weeks. A number of coke manufacturing plants will be built and hundreds of men given employment.

The most of the new properties lie along the Lexington & Eastern branch of the Louisville & Nashville railroad.

The Russian government has given orders for 20 locomotives to the Canadian Locomotive Co. at Kingston.

Production of Steel in Germany

According to the returns issued by the German Association of Iron and Steel Producers, the daily output of steel in Germany in August averaged 52,308 tons, as compared with 52,524 tons daily in July. The total production for the month amounted to 1,412,326 tons, as contrasted with 1,365,641 tons in the previous month. The make of each quality in the three months ended with August has been as follows:

	June, tons.	July, tons.	August, tons.
Basic bessemer .	645,085	637,516	656,366
Bessemer	14,262	18,159	14,247
Basic open-hearth	525,015	560,165	580,128
Acid open-hearth	14,475	19,581	21,145
Basic castings...	62,361	69,216	74,730
Acid castings....	34,300	36,968	38,545
Crucible steel....	8,946	9,612	10,072
Electric steel ...	14,874	14,424	17,093

In Market for Equipment

The Cleveland Wrought Washer Co., Cleveland, recently increased its capital stock from $70,000 to $500,000. The contract for a new 150 x 200-foot building, of saw-tooth roof construction, will be let within a short time. The company hopes to have this structure ready by the first of March, and is at the present time in the market for a full line of machine shop equipment. With the addition of the new plant, cap screws, set screws and screw machine products will be manufactured, machinery to make these products already being on order. The new building is expected to approximately double the present capacity.

Will Use Plant

Toledo, O., Nov. 20.—The plant of the Sandusky branch of the Gartland-Toledo Foundry Co., known as the G. & C. Foundry Co., will be occupied on the first of the coming year. Up to the present time, it has not been decided what class of work will be turned out of this foundry. Nearly 900 tons of pig iron is being melted at the Toledo plant every month and the management reports sufficient contracts to keep the factory in operation at full capacity for the next year.

Opens New Bureau

Toronto, Nov. 20.—The Ontario government is opening a new labor bureau in Toronto, with the primary object of promoting the employment of women in munition factories to a greater extent than at present. It will take over entirely the work of the imperial munitions board in this line and endeavor to get in touch with employers willing to engage women workers. It is expected that the number of women applying will be considerably in excess of the supply of positions and only the strongest and best fitted for the work will be taken. It is proposed to obtain work in other lines of industry for those not adapted for munition work. At present, some 50 women per day are applying for work in the munition plants.

Hydraulic Press Enlarging

Plant extensions are announced this week by the Hydraulic Press Mfg. Co., Mt. Gilead, O. Much new equipment will be purchased. An addition to the machine shop, 100 x 60 feet, will be erected. New equipment will include a 20-ton electric traveling crane, a large motor-driven horizontal boring-mill and a heavy-duty motor driven planer. A 20-foot extension to the power plant will house a new 300-horsepower corliss engine and a 225-kilowatt generator. Two steam boilers and stokers for three boilers will be added. Modern oil tanks with pumps, steam-heating pumps, boiler-feed pumps, etc., will be installed in a new building.

The main stock room will be extended and another story added, and the tool room enlarged. Extension of the erecting shop is planned for the near future.

Obituaries

Benjamin F. Overholt, a coal and coke operator in the Connellsville regions of Pennsylvania, died recently at his home in Scottdale, Pa. He was born at Overton, Pa., July 19, 1849. He was president of the Cambria Fuel Co., of Cambria, Wyo., and the Overholt Coal & Coke Co., of West Virginia. He was one of the organizers of the Scottdale Cast Iron Pipe Foundry, later absorbed by the United States Cast Iron Pipe & Foundry Co.

Hon. David MacKeen, lieutenant-governor of Nova Scotia, who died Nov. 13, at the age of 77, was one of the pioneers of the steel and coal industries of the province. He was born at Mabou, N. S., and began his business career in the service of the Caledonia Coal & Railway Co. in which he ultimately acquired a controling interest. When that company was absorbed by the Dominion Coal Co. he became general manager of the latter. He assisted in establishing the Dominion Iron & Steel Co. and was at the time of his death a director of the Dominion Steel Corporation. He took a prominent part in politics and was elected to the Canadian house of commons in 1887 and in 1896 became a member of the senate. About a year ago, he was appointed lieutenant-governor of the province.

Russian Iron and Steel Industry

The Petrograd correspondent of the *London Times* says that a victorious Russia could not rest content with 1.2 kilometers of railway to 100 square kilometers of surface, when in western Europe the ratio is from 6.7 to 11.8 kilometers to the hundred. He adds that according to the most conservative estimates the rate of Russian railway construction after the war will amount to not less than 7,000 miles per annum, for which will be required about 1,600,000 tons of rails and fastenings, or 800,000 tons more than all existing Russian steel works are able to manufacture.

Greetings by Wireless

Greetings were exchanged Nov. 15, by wireless, across the Pacific ocean between President Wilson and the Emperor of Japan, to mark the inauguration of the Marconi wireless service between the United States and Japan. The American Steel Export Co., New York, was given the privilege of sending the first message outside of those officially exchanged between the President and the Mikado and between the officials of the two governments and the Marconi company. The wireless message sent to the agents of the Steel Export company in Japan was as follows: "Marconi's latest triumph inaugurates new era in interchange of commodities and ideas between our nations instituted by illustrious Perry."

Builds New Plant

A 3-story, 100 x 250-foot building of the reinforced concrete structure will soon be erected by the KD Carburetor Co., Cleveland. The company expects to occupy the new plant, which will be located at E. Thirty-second street and St. Clair avenue, by February, 1917. The cost has been estimated to be approximately $65,000. The company will continue to manufacture carburetors in the new location. It is expected at the present time that little new equipment will be needed. Further additions are to be made in the spring of 1917. The plans were drawn up by the Grieble Engineering Co., Cleveland.

Will Rebuild Plant

The Birmingham Machine & Foundry Co., Birmingham, Ala., which was recently visited by fire, will soon be in condition to resume operations in full. The damage done was very slight and has not interfered in any way with the work on hand.

Small Orders Rule as Prices Change

No Large Individual Contracts Have Been Placed But Heavy Lists Are Pending —Lathes Are Boosted by One Builder, Others May Follow Suit —Heavy Equipment Bought in Pittsburgh

ALTHOUGH there is a scarcity of large transactions, an active demand continues to characterize the machine tool market. Numerous buyers are placing orders for a few tools each and the aggregate of the business booked represents a large outlay. Considerable interest attaches to the prospective requirements of the Standard Ship Building Corporation, which in the last three issues of *The Iron Trade Review* was referred to as having put out inquiries on a huge list of equipment. This concern has issued a revised list which represents a much smaller amount of equipment than originally was inquired for. It is understood that early action will be taken on the new list which involves about $100,000 worth of tools, not counting the hydraulic and power equipment which the company proposes to buy. Among the concerns which are almost constant buyers are the Bethlehem Steel Co. and the General Electric Co. and the combined requirements of these two interests present a huge total. The General Electric Co. has not yet bought the equipment for the plant which it will erect in Bloomfield, N. J. The Marlin Arms Co., Hartford, Conn., recently bought considerable new equipment. Among large prospective buyers in the east are the Kent Motors Corporation and Eastern Motors, Inc. The former concern, of which Mayor Raymond, of Newark, N. J., is a director, plans to build a plant at Belleville, N. J., which will have a capacity for producing 10,000 cars a year. The latter concern, in which Willis D. Upson, Waterbury, Conn., and Fred A. Law, Hartford, Conn., and others are interested, will build a huge plant at Hartford. Foreign demand for machine tools is fair and this week's sales abroad involved upright drills and 16-inch lathes, particularly. Among active foreign buyers at present is Theo. Heide, managing director of the Rosenberg Mek. Verksted, engineers and ship builders, Stavenger, Norway, who is endeavoring to close on a large list of equipment. There was practically no demand from the railroads this week and the only sale that was reported was one to the Southern railroad involving two 20-ton cranes. The Newark, N. J., board of education recently took bids on a list of tools which has not yet been placed. The Lukens Iron & Steel Co., Coatesville, Pa., has bought four 30-ton traveling cranes. The Watervliet arsenal has postponed the opening of bids until Nov. 22 on cranes for handling 18-inch 45-bore guns for the coast defense; bids on two 217-ton cranes and alternating bids on two 185-ton cranes were requested.

Among the interesting developments this week is an advance in prices by one of the prominent lathe builders. This interest has advanced its quotations on all sizes of lathes from 12 to 42 inches by approximately 12½ per cent and the new quotations are higher by that amount than the general level now prevailing. It was considered sometime ago that lathes had about reached the maximum price level but, in view of this advance, it is considered likely that other lathe makers will follow suit.

The Interstate Machine Co., Troy, N. Y., has let a contract for the erection of a new plant. The Transmission Ball Bearing Co., in which W. N. and C. M. Murray, Toronto, Can., and 32 Wells street, New York, are interested, is about to erect a plant at Buffalo. The Lake Torpedo Boat Co., Bridgeport, Conn., has let a contract for a machine shop addition. The Stamford Rolling Mill Co., Stamford, Conn., will erect several additions. The New York, New Haven & Hartford railroad will erect a roundhouse and repair shop at Danbury, Conn. The Monarch Metal & Mfg. Co., Boston, is about to remodel its plant at Cambridge. The Connecticut Brass Co., Cheshire, Conn., will erect a casting shop. The Victor Motor Vehicle Co., Wilmington, Del., has let a contract for the erection of a fair-sized plant. The American Car & Foundry Co., Milton, Pa., has let a contract for a riveting building and a test shop addition. The American Locomotive Co., Schenectady, N. Y., has let a contract for a foundry addition. The American Body Co., Buffalo, will erect a fair-sized addition. The Bennington Scale Co., Bennington, Vt., is about to extend its capacity. The Smith Drum Co., Philadelphia, will erect a machine shop.

Small Orders in Chicago

STEADY buying of single tools and small lots continues in the Chicago market. The amount of this business constitutes a fair total. Inquiry comes for all sorts of equipment and from users in almost every line of production. No demand for machinery for export is being entertained since most of this business is placed direct with manufacturers. Second-hand machinery is fairly active at high prices. Some uncertainty on the part of manufacturers as to labor conditions early next year is having its effect on future orders. The situation renders manufacturers unwilling to sell heavily for spring delivery and stock orders are being taken by some builders only with the provision that the price shall be determined by conditions at the time of delivery.

Heavy Equipment Bought in Pittsburgh

THE completion of plans for new plants and extensions to steel works in nearly all sections of the country has brought out a large number of attractive inquiries for blast furnace and rolling mill equipment at Pittsburgh. Henry Ford, of the Ford Motor Co., Detroit, has awarded contracts for two 500-ton blast furnaces, and the Bethlehem Steel Co. has ordered four blast furnaces of similar capacity from the Riter-Conley Mfg. Co., Pittsburgh, which also will furnish all of the auxiliary equipment. The American Sheet & Tin Plate Co. has awarded contracts for 20 tin mills for installation in plants at Farrell and New Castle, Pa. The Carnegie Steel Co. is negotiating for a long list of tools, including a number of large shears, for its new plant at McDonald, O., and the company is buying shearing and punching equipment for its by-product works at Clairton, Pa. The Bethlehem Steel Co. has awarded contracts for buildings to house 24 hot mills, to be built at Sparrows

The Supreme Test of Reliable Steel

When it comes to the supreme test of engine parts, you'll have to pin the blue ribbon on the ***aeroplane.***

Jerked about; upside down; now looping the loop; now tumbling like a pigeon—the poor old engine has some pretty tough experiences.

AGATHON STEELS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Vanadium
"AGATHON" Chrome Steel
"AGATHON" High Carbon
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Made especially for ***Cams, Crank Shafts, Drive Shafts, Pistons, Transmission Gears, Connecting Rods, etc.***—the kind that can be depended upon to make good under the most severe conditions.

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From the selection of raw materials to the very last of the numerous processes necessary for attaining "AGATHON" quality, we conduct exhaustive tests to make certain that a state of perfection will be reached.

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg., The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd., A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative
J. E. Dockendorff & Co., 20 Broad St., New York, N. Y., General Export Agents

Point, Md. The Morgan Engineering Co., Alliance, O., recently awarded contracts for five large punches and shears.

Good Business Prevails in Cincinnati

IN CINCINNATI, the majority of machine tools being sold at present are for replacement purposes. Practically all new plants under construction in and around Cincinnati have placed their orders for all equipment. A Pittsburgh manufacturer placed an order with a Cincinnati builder last week for 30 lathes ranging from 16 to 18-inch, and is reported to be in the market for another lot almost as large. Boiler and tank makers are rushed and special equipment for these manufacturers has been sold in large lots recently. The Standard Oil Co. will need equipment for a tank shop 210 x 450 feet, to be built at Whiting, Ind.

Cleveland Market Steady

SEVERAL good inquiries have appeared in the Cleveland machine tool market for heavy boring mills. Few builders of this type of tool have the facilities for making these machines in sufficient numbers to satisfy the demand and consequently deliveries are falling behind. Planers are also scarce, and the lack of machines is accentuated by a heavy inquiry for large size tools of this type. The Sidney Tool Co., Sidney, O., is in the market for a plain 12-inch grinder for immediate delivery. The Empire Axle Co., Dunkirk, N. Y., is in the market for drill presses and turret lathes. There have been no price changes.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

From the Alleghenies to the Sea

BROOKLYN.—The Emil Grossman Mfg. Co. has been incorporated with $410,000 capital to manufacture auto accessories and parts, by R. Stern, J. Bregman and H. Radinsky, 233 Broadway.

BUFFALO. — The Batavia Specialty Co., manufacture of tin boxes, is erecting an addition to its plant.

BUFFALO.—The Empire Powder Co. has been incorporated with $100,000 capital, to manufacture chemicals and explosives, by R. C. Taylor, A. E. McBride and F. C. Slee.

ELMIRA, N. Y.—The Elmira Foundry Co. has been incorporated with $95,000 capital to operate a foundry and machine shop, by H. C. Mandeville, A. P. Morrow and F. Levalley, 216 West Ray street.

LOCKPORT, N. Y.—The Harrison Mfg. Co. is having plans drawn by Architect Jas. R. Tyler, Rochester, for a 2-story, 163 x 496-foot plant to cost about $250,000.

MT. VERNON, N. Y.—The D. & W. Machine Co. has been incorporated with $10,000 capital to manufacture machinery, tools, hardware, etc., by H. N. Kelly, R. G. Chase, A. L. King, 431 Homestead avenue.

NORTH TONAWANDA, N. Y. — The Herschell-Spillman Co. plans to build a 4-story factory, 60 x 165 feet, to cost about $50,000. E. O. Spillman, 162 Sweeney street, is president of the company.

PLANDOME, N. Y. — The Delano Self-Starter Co. has been incorporated with $250,000, to manufacture accessories for motor vehicles, by E. Buchignani, W. Webster and C. Adams.

PORT CHESTER, N. Y.—Lomger & Rosenbers are about to convert one of their buildings into a welding shop.

SCHENECTADY, N. Y. — The American Locomotive Co. has let contract for 1-story, 100 x 175-foot foundry addition.

ELIZABETH, N. J.—The Midvale Chemical Co. will erect new factory building to cost $2,500.

ELIZABETH, N. J.—The Peter Breidt City Brewing Co. has taken out a permit for the erection of a new bottling plant in Pearl street to cost $102,718.

NEWARK, N. J.—The Krueger Brewing Co. will erect an addition and make alterations to its brick bottling establishment at 51-57 Belmont avenue to cost $44,640.

NEWARK, N. J.—The Reuter Rubber Co. has been incorporated to manufacture goods with $250,000 capital by George J. Reuter, Alfred Strauss, Fred Seligman, Newark.

TRENTON, N. J.—The Delion Tire & Rubber Co. is about to erect a 3-story, 65 x 175-foot addition.

TRENTON, N. J.—The Luzerne Rubber Co. is about to erect a 2-story, 51 x 125-foot addition.

TRENTON, N. J.—The state board of education will ask legislature for $250,000 to build a new normal school in South Jersey.

VINELAND, N. J.—The Doerr Glass Co. has been incorporated with $50,000 capital to manufacture glass products, by H. R. Doerr, A. J. Doerr, et al.

BEAVER FALLS, PA.—James A. Wetmore, acting supervising architect, treasury department, Washington, is receiving bids for remodeling United States post office.

BEAVER FALLS, PA.—The Beaver Refrigerator & Mfg. Co., New Brighton, Pa., plans to rebuild its plant at Beaver Falls, recently damaged by fire, to cost from $75,000 to $150,000.

BUTLER, PA. — Commissioners of Butler county are receiving bids for a tuberculosis hospital, to cost about $50,000. Harry Wimer is preparing the plans.

CENTERVILLE, PA.—The board of education contemplates a 2-story grade and high school, to cost about $50,000. H. W. Altman, First National Bank building, Uniontown, is preparing the plans.

CONNELLSVILLE, PA. — The state commissioner of health has directed the city to construct a sewage disposal plant. A. O. Bixler is county clerk.

CREIGHTON, PA.—Yost Bros. Co. is about to erect a 1-story, 30 x 150 foot machine shop addition and a 1-story, 50 x 100-foot foundry addition.

FRANKLIN, PA.—The French Creek Foundry Co. will erect a 2-story, 60 x 70-foot steel frame and corrugated iron addition.

GILBERTSVILLE, PA.—The Douglass-Hanover Electric Co. has been incorporated with $5,000,000 capital by E. L. Hubson, East Lansdowne, Harbert J. Rambo, Camden, and P. S. Smythe, Philadelphia.

ERIE, PA.—The Palace Hardware Co., 913 State street, plans to build a warehouse, to cost about $60,000.

JOHNSTOWN, PA.—The board of education plans to erect a 2-story high school, 70 x 200 feet, to cost about $200,000. J. E. Adams, George Wild and associate architects, are preparing the plans.

JOHNSTOWN, PA.—The city council has awarded a contract to the Hackedorn Construction Co., Indianapolis, for a bridge over Stony Creek river, between the Eighth and Seventeenth wards. J. W. Cramer is city clerk.

McKEES ROCKS, PA.—The board of education soon will vote on $150,000 bonds.

MILLVALE, PA.—The Independent Brewing Co., Pittsburgh, is receiving bids on an addition to its plant at Millvale, to cost about $250,000. J. H. Friday, First National Bank building, Pittsburgh, is general manager of the company. Bollinger Bros., Fulton building, Pittsburgh, are the engineers in charge of the work.

MUNHALL, PA.—The board of education has awarded J. G. Fullman, East End Trust building, Pittsburgh, a contract for erecting a high school, to cost $53,337.

PHILADELPHIA. — L. H. Gilmer Co. is having plans prepared by Architect Harry C. Eisenbise, Pennsylvania building, for a 2-story

Preparedness Talks with

ROLLING MILL JIM

Fellows, that cold snap was sure a warnin' of what's coming, and you know what it means to have the rolls and machinery frosted. I must say that the Hubbard Rolls stand this kind of weather better than any of them. Better get the mill dressed for the cold weather.

So long—

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Say you saw it in THE IRON TRADE REVIEW

and basement, 50 x 100-foot manufacturing addition and a 1-story, 23 x 72-foot treating plant.

PHILADELPHIA. — The Smith Drum Co., Allegheny and Lawrence streets, is about to erect a 1-story, 40 x 80-foot machine shop.

PHILADELPHIA.—The Church Lane Garage Co., 5622 Germantown avenue, is about to erect a 1 and 2-story, 76 x 110-foot machine shop and garage.

PHILADELPHIA.—The Abrasive Co. is having plans revised by Architects Stearns & Castor, Stephen Girard building, for a 3-story, 83 x 87-foot crushing plant.

SWISSVALE, PA. — The city is receiving bids for a high school to cost $180,000. C. Howard Lloyd, Telegraph building, Harrisburg, is preparing the plans.

WASHINGTON, PA. — The Electric Reduction Co. has purchased a 5-acre site on which it will erect a factory. W. L. Morrison, superintendent of the company, states that work will start this month.

DOVER, DEL.—The Train Control Appliance Co. has been incorporated with $500,000 capital to manufacture railroad equipment, by J. E. Stevens, C. E. Mundy and George T. Maxwell.

Among New England Factories

BOSTON.—Plans are being figured for a brick, 7-story hotel at 121 and 123 Causeway street for the Merchants Realty Trust.

BOSTON. — Max Strassell, 108 Dorchester street, South Boston, is about to erect 2-story, 50 x 65-foot machine shop.

BOSTON.—The Fairbanks Hammer Co. has been incorporated with $10,000 capital by I. L. Jameson, president; Archibald Parsons, Chelsea, Mass., treasurer and F. M. Whitman.

BOSTON.—The Manhattan Electrical Supply Co., Inc., has been incorporated with $5,000,000 capital by James J. Ryan, John M. Lyan, Charles S. Buckley, Norman J. MacGaffin and Albert A. Richards.

CHELSEA, MASS.—Cutler & Brickman will build a brick, 3-story, 42 x 80 x 44-foot factory at Elm and Maple streets.

CHELSEA, MASS. — H. P. Converse Co. has been awarded the contract to build an oil distributing plant to cost $300,000 on Eastern avenue for the Mexican Petroleum Corp., New York City.

MANSFIELD, MASS. — Fire burned the plant of the Mansfield Milling Co. causing a loss of $30,000.

MANSFIELD, MASS.—The New England Drawn Steel Co. has been incorporated with $210,000 capital by William B. McSkinnon, William F. McCarthy and others.

MIDDLEBORO, MASS. — The town will build a brick and stone, 3-story, 108 x 110-foot high school to cost $100,000.

ROCKLAND, MASS. — The Emerson Shoe Co. will build a 5-story, 45 x 250-foot addition to its factory on Maple street, to cost $30,000.

WORCESTER, MASS. — The Crompton & Knowles Loom works will build a brick and steel, 2-story, 50 x 121-foot kiln and storage building on Illinois street.

WORCESTER, MASS. — The Whitcomb-Blaisdell Machine Tool Co. will build two 1-story, 12 x 120-foot and 9 x 31-foot additions to its plant on Gold street for the storage of castings.

WORCESTER, MASS.—The Baldwin Chain & Mfg. Co. has awarded a contract for a brick, 1-story, 39 x 50-foot addition to its Chandler street plant for an extension of its annealing department.

WORCESTER, MASS. — E. D. Ward has been awarded the contract to build a brick, mill construction, 3-story and basement, 70 x 100-foot store and light manufacturing building to cost $60,000 for the Washburn & Garfield Mfg. Co., at Commercial and North Foster streets.

CENTRAL FALLS, R. I.—The Union Wadding Co. has awarded contract for a brick, 3-story and basement, 60 x 85-foot storage building on Pine street.

HILLSGROVE, R. I. — The Rhode Island Malleable Iron Works has awarded contract for a brick, 1-story, 30 x 87-foot addition to foundry building No. 1.

BRIDGEPORT, CONN.—The Locomobile Co. of America will build a reinforced concrete, 1-story, 100 x 160-foot factory.

BRIDGEPORT, CONN.—The Electric Cable Co. has awarded contract for a brick, mill construction, 4-story, 58 x 130-foot addition to its factory.

BRIDGEPORT, CONN.—The Superior Mfg. Co. has been incorporated with $75,000 capital by E. P. Hyde, D. J. Sullivan and Bessie M. Hyde.

HARTFORD, CONN.—The Eastern Motors Co. has been incorporated with $1,000,000 capital to manufacture a high-grade automobile to be known as the Charter Oak by Fred A. Law, John F. Turk, New York, and Willis D. Upson, Waterbury, Conn.

NEW HAVEN, CONN.—The New Haven Malleable Iron Co. has been incorporated with $50,000 capital by C. M. Brennan, president; E. P. Brennan, vice president and secretary and C. M. Brennan, assistant treasurer.

NORTH HAVEN, CONN. — The United Aluminum & Smelting Co. will erect a brick, 1-story, 100 x 200-foot factory building.

STRATFORD, CONN.—The Bridgeport Steel Co. has been organized with $50,000 capital by George Windsor, president and treasurer; W. H. Leonori, vice president, and B. A. Scrymser, secretary.

WATERBURY, CONN.—The Connecticut Co. is having plans drawn for a brick, 1-story, 162 x 360-foot car barn to cost $125,000.

Activities in the Central States

AKRON, O.—The Burkhart Brewing Co. has been granted a permit to build a $146,000 bottling plant.

BRYAN, O.—The Bryan Pattern & Machine Co. has been incorporated with $25,000 capital, by A. C. Culver, C. L. Newcome, et al.

CLEVELAND.—The W. H. Quinby Co., 500 Euclid avenue, is planning a $30,000 addition to its store. S. R. Barbour is manager.

CLEVELAND.—The Cleveland Macaroni Co. plans to erect a $100,000 addition to its plant at 3300 West Seventy-third street.

CLEVELAND.—The Standard Oil Co. has applied for a permit to erect a U-shaped factory building, 80 x 275 feet, to cost $175,000, at 2811 Broadway.

CLEVELAND.—The Parsons & Parsons Co., 5902 Carnegie avenue, has purchased a site on Forty-sixth street, on which it soon will erect a new plant.

CLEVELAND.—The Scripps Publishing Co. has purchased a site on Rockwell avenue on which an addition for *The Cleveland Press* will be erected.

CLEVELAND.—The Adams-Bagnall Electric Co. is completing an addition to its factory in which will be installed a complete porcelain enameling plant.

CLEVELAND.—The W. C. Owens Co., 1900 Euclid avenue, will receive bids until Nov. 29, for the construction of the Willis hotel in Youngstown, as previously mentioned. The hotel will be 72 x 95 feet, brick and reinforced concrete construction, and will cost about $90,000.

CLEVELAND. — The board of education has filed plans for the Tremont school building, with the building department. The building will be 3-story, 124 x 143 feet, brick, steel and concrete construction and will cost approximately $200,000. The board will also take bids from Dec. 15 to Jan. 1 for the Gladstone school, which will cost about $250,000 and will be the same general construction as the Tremont school.

CLEVELAND. — The Allen-Osborne Co., Rose building, is architect and engineer for the Euclid-Doan Co., which plans to erect five buildings on Euclid avenue near East 105th street. The plans include a commercial and apartment building, a market house and an ice skating rink to cost $150,000 each, a commercial and apartment building to cost $75,000 and an ice manufacturing plant to cost $50,000. G. A. Harvey is president of the Euclid-Doan Co. No contracts have been awarded.

IRONTON, O.—Officials of the Dayton Malleable Co. plan to build an addition to their plant in Ironton.

LEETONIA, O.—The United Iron & Steel Co. will replace the sintering plant which was damaged by fire to the extent of $10,000.

LIMA, O.—Contracts for the new $125,000 Y. M. C. A. building will be awarded some time in November. The structure is to be 4-story, 75 x 160 feet. Shadduck & Hussey, Chicago, are architects.

MANSFIELD, O. — The Mansfield Electric Hardware Mfg. Co. has been incorporated with $20,000 capital, by P. T. Curley, E. J. Gilbert, E. R. Barnes, et al.

PORT CLINTON, O.—The Matthews Engineering Co. plans to move its plant to Sandusky, where it will engage in the manufacture of lighting systems for rural purposes.

TIFFIN, O.—The Kennedy Refractories Co., Bainbridge, Pa., has purchased land at Tiffin and is preparing to erect a lime plant.

TOLEDO, O.—The Saxon Mfg. Co., Herman Saxon, vice president, plans to build a factory to manufacture automobile accessories.

TOLEDO, O.—The Paragon Refining Co. which recently was incorporated with $7,500,000 capital will take over the plant of the company bearing the same name at Ironville. The capacity of the plant will be increased to 65,000 barrels a month.

WARREN, O.—The plant of the General Malleable Works has been badly damaged by fire.

WARREN, O.—The Trumbull Public Service Co. has closed a contract with the Trumbull

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Large capacity and ideal facilities enable us to supply you highest quality work promptly.
Ask us about our eight day delivery schedule; it's interesting.
Superfine Steel Castings
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Automobiles, Auto Trucks and High Grade Machinery
ELECTRIC CASTINGS of the highest Magnetic Permeability, and CASTINGS made of SPECIAL ALLOYS
Do you use
Case Hardening Boxes
and
Lead and Cyanide Pots?
They are our specialty
The
Blackwood Steel Foundry Co.
SPRINGFIELD, OHIO

Say you saw it in THE IRON TRADE REVIEW

Steel Co. for additional power and is now planning on enlarging its plant.

HUNTINGTON, W. VA.—The board of education plans to build a 20-room, 2-story school at Collis avenue and Twenty-sixth street, to cost about $50,000. V. T. Ritter, First National Bank building, is preparing the plans.

KINGSTON, W. VA.—Fayette county is receiving bids for a bridge across Willey fork of Fishing creek. S. Meyers, New Martinsville, is county clerk.

MONTGOMERY, W. VA.—The Charleston Interurban railroad plans to construct a 10½-mile extension to Montgomery. S. Miller Gallaher, Charleston, is superintendent of the railroad.

MORGANTOWN, W. VA.—The board of regents and the board of control of the West Virginia university plan to erect an agricultural building, to cost about $150,000.

WHEELING, W. VA. — The Hazel Atlas Glass Co., Nineteenth and Jacobs streets, has awarded the R. R. Kitchen Co., National Bank building, a contract for erecting a 2-story plant, to cost about $52,000.

ANDERSON, IND.—The board of public works will spend $500,000 in improvements at the electric light plant.

FAIRMOUNT, IND.—The Bell Mfg. Co. is building an addition to provide facilities for a government contract recently taken.

HAMMOND, IND. — The Railway Motor Car Co. of America, with offices at 110 S. Dearborn street, Chicago, has bought the plant of the Fitz-Hugh Luther Co. at Hammond, and will equip it for the manufacture of motor railway cars.

INDIANAPOLIS. — The Guarantee Tire & Rubber Co. has been incorporated with $70,000 capital to manufacture rubber goods, by G. F. Kreitlein, C. W. Minesinger and W. W. Kuhn.

KOKOMO, IND. — The Kokomo Brass Works, William Johnson, manager, will build a 120 x 250-foot foundry.

KOKOMO, IND.—The Hoosier Iron Works Co. will build a plant. It was recently incorporated with $200,000 capital by J. E. Johnson and C. T. Byrne.

MARION, IND.—The Marion Metal Products Co. has been incorporated with $50,000 capital stock to manufacture accessories for automobiles, by W. E. Plummer, C. A. Williams and John R. Browne.

MISHAWAKA, IND. — The South Bend Brass & Machine Foundry Co. will build a plant at Mishawaka. R. G. Fayer is president.

MUNCIE, IND.—The Muncie Cap & Set Screw Co. has been incorporated with $20,000 capital. Directors are John Stetter, William Wuthenow, and Abe Feinberg.

PORTLAND, IND.—The Sheller Wood Rim Mfg. Co. has been incorporated with $25,000 capital by H. E. Sheller, E. J. Minch and E. M. Haynes. Plans are prepared for a new plant which will replace the one that was owned by Mr. Sheller and which recently was seriously damaged by fire.

WHITING, IND.—The Standard Oil Co. will build a 1-story tank shop, 210 x 450 feet, to cost $225,000. The Austin Co., 607 Dwight building, Jackson, Mich., is contracting engineer.

BELLEVILLE, ILL.—The Belleville Commercial Foundry has been incorporated with $2,400 capital stock by Felix Rhein, A. F. Weichert and Alfred Ziehnert.

CHICAGO.—The Accurate Engineering Co., 2419 West Fourteenth street, will build an addition to its shop.

CHICAGO.—Bids will be received until Dec. 1 by H. T. Douglass, chief engineer, Chicago & Alton railroad, 608 South Dearborn street, for a 3 and 5-story freight terminal building of steel and brick to cost $500,000.

CHICAGO.—A. E. Blaich, 1954 Clybourn avenue, will build an addition to his case hardening plant.

CHICAGO.—The H. C. Evans Co., 75 West Van Buren street, is taking bids on a 2-story factory, 75 x 125 feet, to cost $40,000.

CHICAGO. — The Chicago Engineering & Machine Works has been incorporated with $2,500 capital stock by I. C. Woodward, Stanley H. Woodward and Henry W. Steele.

CHICAGO.—The Ghent Motor Co., 20 East Jackson boulevard, is seeking equipment for the manufacture of radiators and sheet metal parts, and front and rear axles.

CHICAGO.—The Chicago sanitary district, 910 South Michigan avenue, is making plans

Business Changes, Consolidations and Expansions

The United States Export Co., Woolworth building, New York, has opened a branch office in the Farmers' Bank building, Pittsburgh, under the direction of Charles E. McKillips. The Pittsburgh office will be a strictly service bureau.

* * *

The John Obenberger Forge Co., West Allis, Wis., has discontinued its office in the Majestic building, Milwaukee, and announces that in the future all business will be transacted at the offices located at its plant Fifty-third and Burnham streets, West Allis.

* * *

Clarence W. March has opened a New York office at 101 Park avenue. Mr. March offers executive experience for engineering investigations, plant designing construction for industrial, chemical and electro-chemical enterprises.

* * *

The George J. Hagan Co., People's Bank building, Pittsburgh, has opened a branch office in the Garfield building, Cleveland.

* * *

The business of Cutter, Fletcher & Co., Boston, certified public accountants, has been transferred to the firm of Clinton H. Scovell & Co., industrial engineers, Boston. The firm name has been changed to Scovell, Willington & Co.

* * *

A New York and New England syndicate has acquired control of the Connecticut Brass Corporation, whose plants are located at Chester, Conn. The syndicate includes J. E. Liggett of the banking house of Liggett-Hichborn & Co., New York, and R. A. Cowles, vice president of the Buffalo Brass & Rolling Mills, Buffalo; E. B. Shoemaker, secretary of the Coe-Stapley Mfg. Co., Bridgeport, Conn., and others.

* * *

The United States Magnesite Corporation, 11 Pine street, New York, has been organized to mine, mill and ship all grades of magnesite, including crude calcine and dead burned.

* * *

The plant of the Hagerstown Metal Stamping Co., Hagerstown, Md., has been purchased by the Poole Engineering & Machine Co., Baltimore, which will use it for the manufacture of brass shell cases.

* * *

The Philadelphia office of Hickman, Williams & Co., pig iron coke, alloys and steel, has been moved from the Pennsylvania building to 901 Morris building.

* * *

The P. & W. Machine Co., Cleveland, has changed its location from Brownell court to East Sixty-second street, near Euclid avenue. The company expects to erect a new plant in the near future.

* * *

The general office of the Thomas Iron Co., including the purchasing and sales departments, has been moved from Easton to Hokendauqua, Pa.

* * *

The Midwest Forge & Steel Co., St. Louis, has acquired the business and plant of the Western Forge Co., East St. Louis.

for the Calumet pumping station, 90 x 133 feet, to cost $2,000,000.

CHICAGO.—The Midland Metal Mfg. Co. has been incorporated with $20,000 capital, by Walter Stead, R. N. McIntosh and Fredcrick Secord.

CHICAGO.—The General Engraving & Mfg. Co. has been incorporated with $50,000 capital by Bernard and Edward Shulman and Meyer Abrams.

CHICAGO.—Davidson & Weiss, architects, 53 W. Jackson boulevard, are preparing plans for a $75,000 addition to the plant of the Continental Can Co., 4640 W. Grand avenue.

CHICAGO.—The Regan Car Co., 322 S. Michigan avenue, will build a 1-story shop, 60 x 200 feet, at 13500 Carondelet avenue, at a cost of $20,000.

CHICAGO.—Plans have been completed for a direct lift bridge over Chicago river at Twelfth street, to cost $600,000. The Strauss Bascule Bridge Co. is engineer. The bridge will require 2,500 tons of steel.

CLINTON, ILL.—DeWitt county plans to build a steel bridge of 128-foot span to cost $9,000. Clifford Older, Springfield, is engineer.

MAYWOOD, ILL.—F. S. Wheeler, president American Can Co., 120 Broadway, New York, is taking bids on a 4-story factory and power plant 268 x 484 feet, to cost $200,000.

NORTH CHICAGO, ILL.—The Chicago Hardware Foundry Co. will build an additional foundry 105 x 135 feet, a portion to be utilized as a machine shop temporarily.

OTTAWA, ILL.—The city of Ottawa plans erecting a bridge over Fox river to cost $15,000.

ROCK ISLAND, ILL.—The city of Rock Island plans to buy a 3,000,000-gallon waterworks pump. M. T. Rudgren is city clerk.

ADRIAN, MICH.—The King Works, Detroit, manufacturer of machine tools, has purchased a plant at 1601 St. Aubin avenue. It is reported additional machinery will be installed.

BENTON HARBOR, MICH. — The Covel Mfg. Co. has been incorporated with $75,000 capital to manufacture machinery and tools, by E. C., A. W. and B. M. Filstrup.

DETROIT.—The International Metal Stamping Co. will start construction at once on a 1-story factory.

GRAND RAPIDS, MICH.—F. E. Burghstaler & Son have the contract for building a new power plant for the National Brass Co. The building will be 40 x 50 feet.

HOWELL, MICH. — The Howell Electric Motors Co. has increased its capital stock from $30,000 to $100,000 and will build and equip an addition 40 x 100 feet.

JACKSON, MICH.—The Hayes Wheel Co. has increased its capital stock from $1,000,000 to $1,500,000 to provide for a wire wheel department.

LANSING, MICH.—The Bates & Edmonds Co. is building an addition to its engine plant.

MANISTEE, MICH. — The Manistee Iron Works will add about $25,000 worth of new equipment.

MUSKEGON, MICH.—The Universal Valveless Four-Cycle Motor Co., which recently was incorporated with $250,000 capital, has started work on its new plant. C. E. Johnson, president of the Piston Ring Co., has been made manager of the new concern.

OWOSSO, MICH.—The Standard Machine Co. has started to erect a 2-story, 40 x 120-foot machine shop and a 50 x 80-foot foundry.

ST. JOSEPH, MICH. — The Automobile Specialties Co. is enlarging its plant.

YPSILANTI, MICH.—The Ypsilanti Motor Truck Co. has been incorporated with $50,000 capital, by G. E. Porter, R. W. Ashton and H. R. Scovill.

BURLINGTON, WIS.—The Osborne Casting Co. will build a foundry costing $20,000.

FOND DU LAC, WIS. — The Dallman & Cooper Co., 18-22 Third street, mill supplies, traction and farm engines, etc., is razing its frame warehouse and will erect a modern concrete and brick building, 40 x 175 feet.

GRESHAM, WIS. — The Gresham Electric Light & Power Co. has been given a franchise for an electric light plant. L. O. Laundenstein is village clerk.

MADISON, WIS.—Bids will be received until Nov. 21 by the city clerk for an 8,000,000-gallon, horizontal, cross-compound pumping engine, three air compressors, new stack and furnaces in two 200-horsepower Sterling boilers. Mead & Seastone, Madison, are consulting engineers.

MILWAUKEE.—The Milwaukee Steel Foundry Co., J. G. Shaw, manager, will build a machine shop costing $10,000.

MILWAUKEE.—The Burrell Fuel Saver Co. has been incorporated with $10,000 capital stock to manufacture carburetors, by A. A. Giese, A. J. Melms and M. J. Eisner.

MILWAUKEE.—The Maynard Steel Co. will build an addition to its foundry at a cost of $12,000. C. J. Keller, Germania building, is architect.

MILWAUKEE.—The A. O. Smith Co. has increased its capital stock from $1,000,000 to $3,000,000 to provide for increasing volume of business.

MILWAUKEE. — The Mueller Furnace Co. will build a foundry and cupola, 1-story, 110 x 182 feet, and a 2-story portion 27 x 50 feet. The Worden Allen Co., 208 South La Salle street, Chicago, is engineer.

MILWAUKEE.—The Michie Construction Co. has taken the general contract for erecting a new core building, 40 x 75 feet, costing $12,000, for the Stowell Co., South Milwaukee, formerly the Stowell Mfg. & Foundry Co. Work will start at once.

MILWAUKEE. — Klug & Smith, engineers, Mack block, have awarded all contracts for the erection of a 1-story drop forge shop addition, 50 x 200 feet, for the Ladish-Obenberger Co., at Cudahy, Milwaukee county, and work is now under way.

OSHKOSH, WIS.—The Oshkosh Gas Light Co. will build an addition to its plant.

OSHKOSH, WIS.—The Diamond Match Co. will erect a new fireproof plant to replace the present factories at Oshkosh, of which L. Frank Gates is general manager. Work will begin soon on the erection of a reinforced concrete and brick warehouse, 160 x 165 feet, 4-story and basement.

PLYMOUTH, WIS. — Sealed bids will be taken by the municipal water and light commission until Nov. 24, for a single phase air compressor, with short belt drive; a single stage centrifugal pump, 1,050 gallons per minute; a mixed pressure steam turbine, 100 boiler horsepower; a rotary jet condenser, 5,000 pounds of steam per hour; and an independent air pump and jet condenser, 1,000 pounds of steam per hour. Thomas S. Watson Co., 1412 Majestic building, Milwaukee, are consulting engineers. A. H. Luedtke is city clerk.

RACINE, WIS.—The Harvey Spring & Forging Co. will build a plant 100 x 200 feet.

WAUKESHA, WIS.—Van Ryn & DeGelleke, architects, Caswell block, Milwaukee, have been selected by the board of education, Waukesha, to design and supervise the construction of the proposed new $100,000 high school; the $30,000 Park school, and a $25,000 central light, heat, and power plant, and for the remodeling of the Union school at a cost of $35,000. The high school will have an area of 140 x 150 feet and will be 2 story, containing 16 classrooms, 800-seat auditorium, gymnasium and manual training and domestic science departments.

WEST ALLIS, WIS.—Plans are being prepared for an addition by the Pressed Steel Co., R. H. Hackney, general manager.

KANSAS CITY, MO.—The Walls Frogless Switch Co. will build a 1-story factory, 75 x 116 feet, to cost $100,000. H. H. Hill, 823 Gloyd building, is architect.

KANSAS CITY, MO. — Bids will be received until Nov. 22 on a reinforced concrete bridge at Seventy-first street, costing $150,000 and requiring 600 tons of reinforcing steel. Waddell & Son, 800 Graphic Arts building, are engineers.

SPRINGFIELD, MO. — The Heywood Wrench Co. is planning to build a plant at Springfield.

ST. LOUIS.—The Wrought Iron Range Co. will build an addition to its machine shop.

ST. LOUIS.—The Ever Tight Piston Ring Co. has added $47,500 to its capital and will enlarge its capacity.

ST. LOUIS.—Plans for a municipal electric light plant are being discussed. The board of aldermen has voted $12,500 for a preliminary survey.

ST. LOUIS.—The Central Iron Co. has purchased a site on North Sixteenth street, near Cass avenue, on which it will erect a shearing shop.

ST. LOUIS. — The Inland Machine Works has been incorporated with $30,000 capital to manufacture tools, dies, metal and wood products. Its representative is H. S. Gould, 37 Wall street, New York.

ST. LOUIS.—The St. Paul Foundry Co., organized and operating under the laws of Minnesota, has been granted a license to conduct business in Missouri. The company will employ $30,000 of its capital in the state.

CHARLES CITY, IA.—The Hart-Parr Co. has started to erect a new steel foundry which, with equipment, will cost over $100,000. It will be equipped with two 25-ton open-hearth furnaces.

FAIRFIELD, IA.—The state highway commission at Ames is planning to build a steel bridge containing three truss spans of 124 feet each over the Skunk River. D. L. Teal is county engineer.

FORT DODGE, IA.—The Fort Dodge Culvert Co. will build a factory costing $20,000 at Seventh street and Seventh avenue.

FORT MADISON, IA. — The American Fork & Hoe Co. will proceed at once to build a plant costing about $100,000.

ROCK RAPIDS, IA.—Lyon county will soon receive bids on 16 bridges to cost about $70,000.

ALBERTINE, MINN.—The Enderes Mfg. Co., manufacturer of tools, will build a factory to cost $8,000.

DULUTH.—The Diamond Calk Horseshoe Co., Otto Swanstrom, president, will enlarge its plant at a cost of $55,000.

DULUTH.—The Coats & Tweed Mining Co. has engaged the Foster Construction Co., 534 Caswell block, Milwaukee, as general contractor for important improvements and extensions costing $200,000, at its mining plant at Verona, Mich. The first will be a laboratory, 30 x 40 feet; office, 40 x 80 feet, two stories high; later there will be erected a machine shop; power house, dryhouse, warehouse, blacksmith shop, clubhouse, 50 frame miners' cottages, five frame boarding houses. The Foster company has sublet considerable of the work, which will be undertaken at once. Shops, however, will not be erected until spring.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

Bessemer valley	$30.00
Bessemer, Pittsburgh	30.95
Basic, Pittsburgh	25.95
Basic, eastern Pa.	26.50 to 27.00
Basic, Buffalo	25.00 to 26.00
Malleable, Pittsburgh	26.95 to 27.95
Malleable foundry, Chicago	27.00 to 28.00
Malleable foundry, Philadelphia	28.50 to 29.00
Malleable foundry, Buffalo	25.00 to 27.00
No. 1X foundry, Philadelphia	26.50 to 27.00
No. 2 foundry, Pittsburgh	26.95 to 27.95
No. 2 foundry, Cleveland	26.30 to 27.30
No. 2 foundry, Ironton	25.00 to 26.00
No. 2 foundry, Chicago	27.00 to 28.00
No. 2X foundry, Philadelphia	25.50 to 26.50
No. 2X foundry, N. J. tidewater	25.50 to 26.50
No. 2X foundry, Buffalo	25.00 to 27.00
No. 2 plain, Philadelphia	25.00 to 25.50
No. 2 plain, N. J. tidewater	25.00 to 25.50
No. 2 plain, Buffalo	25.00 to 27.00
No. 2 southern, Birmingham	20.00 to 22.50
No. 2 southern, Cincinnati	22.90 to 25.40
No. 2 southern, Chicago	24.00
No. 2 southern, Phila. delivery	24.50 to 25.00
No. 2 southern, Cleveland	24.00 to 26.50
No. 2 southern, New York docks	24.25 to 24.75
No. 2 southern, Boston docks	24.50 to 25.00
No. 2 south. interior, New Eng.	25.00 to 26.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	24.00 to 25.00
Virginia, No. 2X, Philadelphia	26.75 to 27.75
Virginia, No. 2X, Jersey City	27.00 to 28.00
Virginia 2X, Boston points	27.25 to 28.25
Gray forge, eastern Pa.	23.00 to 24.00
Gray forge, Pittsburgh	25.95
Gray forge, Birmingham	18.00
Silveries, 8 per cent, furnace	30.00 to 31.00
Silveries, 8 per cent, Chicago	29.50 to 30.50
Low phos. Standard, Phila.	47.00 to 49.00
Low phos. Lebanon, Pa., furnace	38.00 to 39.00
Low phos., Pittsburgh	43.00 to 45.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	20.75 to 22.75
Charcoal, Buffalo	24.00 to 27.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bes., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit.	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	9.0c to 9.50c
Port Henry lump, at mines, ton	$4.00

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellsville furnace	$6.00 to 7.00
Connellsville fur., contract	3.75 to 4.00
Connellsville foundry, contract	6.25 to 6.75
Connellsville foundry	9.50 to 10.00
Wise county furnace, contract	4.50 to 5.00
Wise county foundry, contract	5.00 to 6.00
Pocahontas foundry, contract	5.00 to 6.00
Pocahontas furnace, contract	4.50 to 5.00
New River foundry, contract	5.50 to 6.00
New River furnace, contract	5.00 to 5.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, or delivered prompt.	$160 to 165
Ferro manganese, 80 per cent, seaboard, or delivered, contract	160 to 165
Spiegel, 20 per cent, fur. early and last half	45.00 to 50.00
Ferro-silicon, 50 per cent, Pbg.	95.00 to 100.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $34.00; 10 to 11 per cent, $35.00; 11 to 12 per cent, $36.00; 12 to 13 per cent, $37.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$50.00 to 55.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal	70.00 to 80.00
Forging billets, Chicago	70.00
Wire rods, Pittsburgh (nom.)	65.00
Bessemer billets, Youngstown	55.00
Bessemer billets, Pittsburgh	55.00
Open hearth billets, Pittsburgh	55.00
Open hearth billets, Youngstown	55.00
Bess. sheet bars, Youngstown	55.00
Op. h'th sheet bars, Youngstown	55.00
Bess. sheet bars, Pittsburgh	55.00
Open hearth sheet bars, Pbgh	55.00
Muck bars, Pittsburgh (nominal)	50.00

SKELP

Grooved steel skelp	3.00c
Sheared steel skelp	3.50c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$38.00
Stan. op-h'th rails, Pbg. & Chgo.	40.00
Light rails 8 to 10 lbs., Pbgh	45.00
Light rails, 8 lb., Chicago	48.00
Light rails, 12 to 14 lbs., Pbgh	44.00
Light rails, 12 lbs., Chicago	46.00
Light rails, 16 to 20 lbs., Pbgh	43.00
Light rails, 16 to 20 lbs., Chgo.	$45.00
Light rails, 25 to 45 lbs., Pbgh.	42.00
Light rails, 25 to 45 lbs., Chgo.	44.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c to 2.50c
Angle bars, st. sections, Chgo.	2.25c to 2.75c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	4.25c to 4.75c
Track bolts, Chicago	4.25c to 4.50c
Tie plates, Chicago	50.00 to 55.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, con. Pbgh	3.00c
Structural shapes, Pbgh	3.00c to 3.25c
Structural shapes, Philadelphia	2.959c to 3.159c
Structural shapes, Chicago	3.09c to 3.50c
Structural shapes, New York	2.969c to 3.169c
Tank plates, Chicago	3.54c to 3.75c
Tank plates, Pittsburgh (con.)	3.50c to 4.50c
Tank plates, Pittsburgh	4.00c to 4.50c
Tank plates, Philadelphia	3.659c to 4.159c
Tank plates, New York	3.669c to 4.169c
Bars, soft steel, Chicago	2.99c to 3.50c
Bars, soft steel, Pbgh (con.)	2.90c
Bars, soft steel, Pittsburgh	3.00c to 3.25c
Bars, soft steel, New York	2.869c to 3.159c
Bars, soft steel, Philadelphia	2.859c to 3.169c
Hoops, carloads, Pittsburgh	3.25c
Bands, Pittsburgh	2.70c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chicago	2.60c to 2.65c
Bar iron, Philadelphia	2.559c to 2.659c
Bar iron, Cleveland	2.60c to 2.70c
Bar iron, New York	2.569c to 2.669c
Bar iron, Pittsburgh	2.90c to 3.00c
Hard steel bars, Chicago	2.50c to 2.60c

SHEETS

(In cents per pound.)
(Open hearth material takes 10c above prices of bessemer.)

SHEET MILL BLACK.

Gage.	Bessemer.
17 to 21	3.45
22 to 24	3.50
25 and 26	3.55
27	3.60
28	3.65
29	3.70
30	3.80

TIN MILL BLACK.

Gage.	Bessemer.
15 and 16	3.45
17 to 21	3.50
22 to 24	3.55
25 to 27	3.60
28	3.65
29 and 30	3.70
30½ and 31	3.75

GALVANIZED.

Gage.	Bessemer.
10 and 11	4.00 to 4.50
12 to 14	4.10 to 4.60
15 and 16	4.25 to 4.75
17 to 21	4.40 to 4.90
22 to 24	4.55 to 5.05
25 and 26	4.70 to 5.20
27	4.85 to 5.35
28	5.00 to 5.50
29	5.20 to 5.70
30	5.40 to 5.90

BLUE ANNEALED.

Gage.	Bessemer.
3 to 8	3.50
9 to 10	3.25
11 to 12	3.25
13 and 14	3.35
15 and 16	3.40

No. 28 black, Chicago	4.19c to 4.44c
No. 28 galvanized, Chicago	5.19c
No. 10 blue annealed, Phila.	3.419c
No. 10, blue annealed, Chgo.	3.69c to 3.94c

TIN PLATE

Tin plate, 100 lb., coke base	6.00c to 7.00c
Terne plate	5.25c to 5.65c

IRON AND STEEL PIPE

(Prices adopted Nov. 15, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	61	34½
½ in.	65	50½
¾ to 3 in.	68	54½
Lap weld:—		
2 in.	61	48½
2½ to 6 in.	64	51½
7 to 12 in.	61	47½
13 and 14 in.	51½	....
15 in.	49	....

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	46	18
⅜ in.	47	19
½ in.	51	32
¾ to 1½ in.	54	37
Lap weld:—		
1¼ in.	40	24
1½ in.	46	31
2 in.	47	32
2½ to 6 in.	49	35
7 to 12 in.	48	34

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	52
Iron, 3½ to 4½ inches, l. c. l.	42

IRON AND STEEL PRICES

Corrected up to Tuesday noon

WIRE PRODUCTS

(Adopted Nov. 6, 1916.)
(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.85
Plain wire, jobbers', Pittsburgh	2.80
Galvanized wire, jobbers', Pbgh	3.50
Polished staples, Pbgh	3.00
Galvanized staples, Pbgh	3.70
Barb wire, painted, jobbers', Pbgh.	3.00
Barb wire, galv., jobbers', Pbgh	3.70

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50; cut threads, 40, 7 and ½, larger or longer, 35.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50, and 5; cut, 40, 10 and 5; larger or longer, 40.

Cold pressed, semi-finished hexagon nuts, 60.

Gimlet and cone point lag bolts, 50. Hot pressed square nuts, blanks, $2.60 off; tapped $2.40 off. Hot pressed hexagon nuts, blank, $2.60 off; tapped, $2.40 off.

Cold pressed square nuts, blank, $2.20 off; tapped, $2.00 off. Cold pressed hexagon nut, blank, $2.50 off; tapped, $2.25 off.

RIVETS

Structural rivets, Pbgh	4.15c
Boiler rivets, Pbgh	4.25c

Tinner's rivets, 45, and 10 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	3.00c

STANDARD STEEL CHAIN

Chain, ¾ inch proof coil	5.50c

COLD ROLLED STRIP STEEL

Base price 6.50c to 7.00c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

CAST IRON WATER PIPE

Four-inch, Chicago	$40.00 to 41.00
Six-inch and larger, Chicago	37.00 to 38.00
Six-inch Class B, New York	37.50
Four-inch Class B, New York	40.50
Four to six-inch Birmingham	33.00 to 34.00
Six-inch and larger, Birmingham	30.00 to 31.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.35c
Steel squares, 2-in. & ov., Cleve.	4.00c
Steel rounds, 2-in. & ov., Cleve.	4.00c
Steel bars, und. 2 in., Cleveland	3.50c
Steel bars, Detroit	3.35c
Steel bars, Philadelphia	3.40c to 3.50c
Steel bars, New York	3.50c
Steel bars, St. Louis	3.40c
Steel bars, Cincinnati	3.45c to 4.00c
Steel bars, St. Paul	3.45c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.50c
Iron bars, Chicago	3.35c
Iron bars, Cleveland	3.35c
Iron bars, Detroit	3.35c
Iron bars, St. Louis	3.30c to 3.35c
Iron bars, Cincinnati	3.45c to 4.00c
Iron bars, Philadelphia	3.40c to 3.50c
Iron bars, New York	3.50c
Shapes, Chicago	3.35c
Shapes, Detroit	3.45c
Shapes, St. Louis	3.40c
Shapes, St. Paul	3.45c
Shapes, New York	3.50c
Shapes, Cleveland	3.60c
Shapes, Philadelphia	3.40c to 3.50c
Shapes, Buffalo	3.60c
Shapes and plates, Cincinnati	3.55c to 4.10c
Plates, Chicago	4.00c
Plates, Detroit	4.10c
Plates, St. Louis	4.05c
Plates, St. Paul	4.10c
Plates, New York, wide	4.75c
Plates, New York, narrow	4.50c
Plates, Cleveland	4.10c
Plates, Philadelphia	4.25c to 4.75c
No. 10 blue anl. sheets, Chicago	3.80c
No. 10 blue anl. sheets, Cleve.	3.90c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.85c
No. 10 blue anl. sheets, Cinci.	3.90c
No. 10 blue anl. sheets, St. Paul	4.00c
No. 10 blue anl. sheets, Detroit	3.80c
No. 28 black sheets, Chicago	4.25c
No. 28 black sheets, Cleveland	3.90c
No. 28 black sheets, Cincinnati	3.90c
No. 28 black sheets, Detroit	4.10c
No. 28 black sheets, St. Louis	4.30c
No. 28 black sheets, St. Paul	4.55c
No. 28 galv. sheets, Chicago	5.85c
No. 28 galv. sheets, Cleveland	5.75c
No. 28 galv. sheets, Cincinnati	5.50c
No. 28 galv. sheets, Detroit	5.50c
No. 28 galv. sheets, St. Louis	5.75c to 5.95c
Hoops, Cleveland	4.25c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$26.00 to 27.00
Angle bars, steel, St. Louis	19.50 to 20.00
Arch bars and transoms, Chgo.	27.50 to 28.00
Arch bars and transoms, St. L.	26.00 to 27.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	14.00 to 14.50
Boiler punchings, Chicago	18.00 to 19.00
Bundled sheet, Cincinnati	9.75 to 10.25
Busheling, No. 1, Chicago	17.50 to 18.00
Busheling, No. 1, Cincinnati	13.75 to 14.25
Busheling, No. 1, Cleveland	17.50 to 18.50
Busheling, No. 1, St. Louis	16.50 to 17.00
Busheling, No. 2, Chicago	12.00 to 13.00
Cast borings, Chicago	7.75 to 8.25
Cast borings, Cincinnati	5.50 to 6.00
Cast borings, Cleveland	8.75 to 9.00
Cast borings, St. Louis	7.00 to 7.50
Cast, No. 1, Chicago	15.50 to 16.00
Cast, No. 1, Cincinnati	14.00 to 14.50
Cast, No. 1, Cleveland	17.50 to 18.00
Cast, No. 1, St. Louis	15.00 to 16.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	20.50 to 21.00
Iron axles, St. Louis	33.50 to 34.00
Iron axles, Cleve.	38.00 to 39.00
Knuckles, coup., Chicago	22.50 to 23.00
Knuckles, coup., St. Louis	20.50 to 21.00
Locomotive tires, Chicago	26.50 to 27.00
Locomotive tires, St. Louis	23.50 to 24.00
Machine shop turnings, Chicago	7.75 to 8.25
Machine shop turnings, Cleve.	8.50 to 8.75
Machine shop turn'gs, Cincinnati	6.00 to 6.50
Machine shop turnings, St. L.	7.00 to 7.50
Malleable agricultural, Chgo.	13.00 to 13.50
Malleable agricultural, St. Louis	14.50 to 15.00
Malleable, Cincinnati	9.75 to 10.25
Malleable railroad, Chicago	16.00 to 16.50
Malleable railroad, St. Louis	15.50 to 16.00
Pipes and flues, Cleveland	15.00 to 15.50
Pipes and flues, Chgo.	15.00 to 16.00
Pipes and flues, St. Louis	15.00 to 15.50
Railroad wrought, No. 1, Cleve.	22.00 to 23.00
Railroad wrought, No. 1, Chgo.	22.00 to 22.50
Railroad wrought, No. 1, Cinci.	16.50 to 17.50
Railroad wrought, No. 1, St. L.	20.00 to 20.50
Railroad wrought, No. 2, Chgo.	21.00 to 21.50
Railroad wrought, No. 2, St. L.	19.00 to 19.50
Shafting, St. Louis	25.00 to 26.00
Springs, Chicago	22.50 to 23.00
Steel car axles, St. Louis	37.00 to 38.00
Steel car axles, Chicago	37.00 to 38.00
Stove plate, Chicago	11.25 to 11.75
Stove plate, Cleveland	13.50 to 14.00
Stove plate, Cincinnati	9.50 to 10.00
Stove plates, St. Louis	14.00 to 14.50

(Gross tons.)

Axle turnings, Cleveland	$13.50 to 14.00
Busheling, No. 1, Buffalo	17.00 to 18.00
Busheling No. 1, Pittsburgh	15.25 to 16.00
Busheling, No. 2, Buffalo	12.50 to 13.00
Bundled sheets, Pittsburgh	13.00 to 13.50
Hydraulic compressed sheets, Pbg.	18.50
Bundled sheets, Cleveland	12.50
Bundled sheets, Buffalo	13.50 to 14.00
Car wheels, (iron), Pittsburgh	20.00 to 20.50
Car wheels, (steel), Pittsburgh	25.00 to 26.00
Car wheels, Chicago	17.25 to 17.75
Car wheels, eastern Pa.	18.00 to 18.50
Car wheels, Buffalo	18.00 to 18.50
Car wheels, New York	16.50 to 17.00
Car wheels, St. Louis	16.00 to 16.50
Car wheels, Birmingham	14.00 to 15.00
Tram car wheels, Birmingham	13.00 to 14.00
Cast borings, New York	9.50 to 10.00
Cast borings, eastern Pa.	12.00 to 12.50
Cast borings, Buffalo	9.50 to 10.00
Cast borings, Pittsburgh	12.00
Cast, No. 1, eastern Pa.	18.50 to 19.00
Cast, No. 1, Pittsburgh	17.00 to 18.00
Cast, No. 1, Birmingham	16.00 to 17.00
Cast, heavy No. 1, N. J. points	17.75 to 18.00
Forge, No. 1, eastern Pa.	14.00 to 14.50
Frogs, swithes, guards, St. L.	21.00 to 21.50
Grate bars, Buffalo	14.00 to 14.50
Grate bars, N. J. points	13.50 to 14.00
Heavy axle turnings, Buffalo	14.00 to 14.50
Heavy melting steel, Pittsburgh	22.50 to 23.00
Heavy melting steel, Buffalo	20.00 to 20.50
Heavy melting steel, Chicago	20.00 to 20.50
Heavy melting steel, Cleveland	20.00 to 21.00
Heavy melting steel, Cincinnati	19.50 to 21.00
Heavy melting steel, eastern Pa.	21.00 to 21.50
Heavy melting steel, New York	18.50 to 19.00
Heavy melting steel, St. L.	22.00 to 22.50
Heavy melting steel, Birmingham	17.00 to 18.00
Hydraulic pressed sheet, Cleve.	17.00 to 17.50
Iron rails, Chicago	26.00 to 26.50
Iron rails, Buffalo	20.50 to 21.00
Iron rails, Cincinnati	20.00 to 20.50
Iron rails, St. Louis	23.00 to 23.50
Iron rails, Cleveland	24.00
Iron axles, Pittsburgh	38.00 to 40.00
Iron axles, Cincinnati	28.00 to 30.00
Iron axles, eastern Pa.	36.00 to 37.00
Iron axles, Chicago	38.00 to 40.00
Iron axles, Buffalo	35.00
Low phos. steel, Buffalo	25.00 to 25.50
Low phos. steel, Pittsburgh	26.00 to 27.00
Low phos. steel, eastern Pa.	28.00 to 30.00
Machine shop turnings, Buffalo	8.50 to 9.00
Mch. shop turnings, New York	9.00 to 9.25
Mch. shop turnings, Pittsburgh	11.00 to 11.75
Mch. shop turnings, eastern Pa.	11.00 to 11.50
Mch. shop turnings, Birmingham	7.00 to 7.50
Malleable railroad, Cleveland	20.00 to 21.00
Malleable railroad, Buffalo	18.00 to 18.50
Malleable railroad, Pittsburgh	16.50 to 16.75
Malleable railroad, eastern Pa.	15.50 to 16.00
R. R. and mch. cast, No. 1 Bfl.	19.00 to 20.00
R. R. wrought, No. 1, Buffalo	22.00 to 22.50
R. R. wrgt., No. 1, eastern Pa.	24.50 to 25.00
City wrought, New York	17.00 to 17.50
R. R. wrought, No. 1, Pbgh.	23.50 to 24.50
R. R. wrought, No. 1, B'ham.	16.00 to 17.00
Reroll. rails, 5 ft. and ov., Pbg.	25.00 to 27.00
Reroll. rails, 5 ft. & ov., Chgo.	26.00 to 26.50
Reroll. rails, 5 ft. & ov., E. Pa.	24.00 to 25.00
Reroll. rails, 5 ft. & ov., St. L.	23.50 to 24.00
Shafting, New York	22.00 to 23.00
Shafting eastern Pa.	24.00 to 25.00
Shoveling steel, Chicago	18.25 to 18.75
Shoveling steel, St. Louis	20.00 to 20.50
Steel rails, short, Chicago	23.00 to 24.00
Steel rails, short, Cleveland	23.00 to 23.25
Steel rails, over 6 ft. Cleveland	23.00 to 24.00
Steel rails, old, Birmingham	17.00 to 18.00
Steel rails, short, St. Louis	21.50 to 22.00
Steel car axles, Birmingham	26.00 to 27.00
Steel car axles, New York	36.00 to 37.00
Steel car axles, Buffalo	35.00
Steel car axles, Cleveland	41.00 to 42.00
Steel car axles, Pittsburgh	38.00 to 40.00
Steel car axles, eastern Pa.	36.00 to 37.00
Stove plate, N. J. points	14.00 to 14.50
Stove plate, Birmingham	12.00 to 13.00
Stove plate, Buffalo	14.25 to 14.75
Stove plate, eastern Pa.	15.00 to 15.50
Stove plate, Pittsburgh	13.00 to 13.50
Wrought pipe, Buffalo	14.50 to 15.00
Wrought pipe, eastern Pa.	17.50 to 18.00
Wrought pipe, New York	15.00 to 15.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACCUMULATORS.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS. (Hydraulic.)
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Southwark Fdy. & Mch. Co., Philadelphia, Pa.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Oxweld Acetylene Co., Chicago, Ill.
Prest-O-Lite Co., The, Indianapolis, Ind.

AEROPLANE WIRE, STRAND AND CORD.
American Steel & Wire Co., Chicago, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng.
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Alloys Steel Corp., The, Canton, O.

ALUMINUM. (Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS. (Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Blackwood Steel Fdy. Co., The, Springfield, O.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANTIMONY.
Wah-Chang Mining & Smelting Co., New York City.

ANTIMONY OXIDES.
Wah-Chang Mining & Smelting Co., New York City.

ARCHITECTURAL SHAPES.
Empire Art Metal Co., College Pt., N. Y.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AUTO TOWING CABLES.
American Steel & Wire Co., Chicago, Ill.

AXLES.
American Bridge Co., New York City.
American Steel Export Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.
Ryerson, Jos. T., & Son, Chicago, Ill.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALE TIES.
American Steel & Wire Co., Chicago, Ill.

BALLS. (Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS. (Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES. (Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING. (Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS. (Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS. (Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Company, Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Alloys Steel Corp., The, Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BEAMS, CHANNELS AND ANGLES.
American Steel Export Co., New York City.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Empire Art Metal Co., College Pt., N. Y.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS. (Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS. (Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING. (Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING. (Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES. (Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES. (Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL, RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BESSEMER SQUARES. (Soft.)
Witherow Steel Co., Pittsburgh, Pa.

BILLETS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BINS. (Steel.)
Empire Art Metal Co., College Pt., N. Y.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS. (Chain.)
Yale & Towne Mfg. Co., New York City.

BLOOMS.
American Steel Export Co., New York City.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above